MARATHON

STADIA Integration Hub

Release 5.0

Integration Multiplexer User's Manual

Part Number 800-1841-50, Rev. A

For the Following Units:

Marathon 20K
Marathon 10K
Marathon 5K Turbo
Marathon 3K
Marathon 2K
Marathon 2K *Plus*

April 1996

Notice of Filing

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Safety Warnings and Cautions

Various safety agencies request statements of warning or caution to help you in the safe operation of the MICOM unit. These statements also apply to any and all modules installed within the unit.

To ensure adequate cooling of the equipment a 2.0 inch unobstructed space must be maintained around all sides of the unit.

The ac power socket shall be installed near the equipment and shall be easily accessible.

Installation and access to the interior of this unit shall be made only by a qualified technician.

Connection to the network is to be disconnected before the (mains) plug is removed.

Warning

Remove power plug from the power socket before performing any service work on the unit.

Lithium Battery Caution

Danger of explosion if battery is incorrectly replaced. Replace only with the same type or equivalent battery, as recommended by the manufacturer. Discard used batteries according to manufacturer's instructions.

The power supply is auto-ranging in this model.

The power supply cordset to be supplied in Europe must have 0.75^2mm, 3 conductor "HAR" cord type H05VV-F, terminated in a grounding type Shucko plug on one end and a molded-on IEC 320 connector on the other end.

Technical Data

Input Volts	:	100-240 Vac −5%, +10%
Input Current		
Marathon 5K Turbo, 10K, 20K		
NetRunner 500ET, 1000E, 2000E	:	3A-1.5A
Marathon 2K, 2K *Plus*, 3K		
NetRunner 75E	:	2A-1A
STADIA Integration Hub	:	6A-3A
Frequency	:	47-63 Hz

Um die Kühlung des Gerätes nicht zu beschränken, ist es notwendig um das Gerät herum an allen Seiten ca 5 cm Raum zu lassen.

Stellen Sie das Gerät in der Nähe einer geerdeten Schutzkontakt-steckdose so auf, dass diese leicht erreichbar und zugänglich ist.

Die Montage und der Zugang ins Innere des Gerätes sind nur einem qualifizierten Techniker gestattet.

Ehe der Netzstecker aus der Steckdose gezogen wird, müssen sämtliche äusserliche Verbindungen vom Gerät getrennt werden.

Warnung

Vor öffnen des Gerätes, muss der Netzstecker aus der Steckdose gezogen werden.

Lithium Batterie Warnung

Explosionsgefahr besteht wenn die Batterie nicht richtig ersetzt ist. Die Batterie darf nur mit einer gleichen oder gleichwertigen Batterie ersetzt werden.

Netzteil ist mit automatischer Umschaltung entsprechend der Versorgungsspannung versorgt.

Die Netzleitung sollte ein harmonisierter Typ (HAR) sein, mit der Bezeichnung H05VV-F oder H05VVH2-F, 3G 0.75^2mm, mit einem Schutzkontakt – und einem Kaltgerätestecker (IEC 320).

Technische Daten

Nennspannung	:	100-240 V∼ −5%, +10%
Nennstrom		
Marathon 5K Turbo, 10K, 20K		
NetRunner 500ET, 1000E, 2000E	:	3A-1.5A
Marathon 2K, 2K *Plus*, 3K		
NetRunner 75E	:	2A-1A
STADIA Integration Hub	:	6A-3A
Frequenz	:	47-63 Hz

Pour assurer un refroidissement adéquat, maintenir un espace libre de 5 cm (2 pouces) tout autour de l'appareil.

Installer la prise AC à proximité de l'appareil, dans un rayon d'accès facile.

L'installation et l'ouverture de cet appareil est permise par un technicien autorisé seulement.

Avant de débrancher la prise de courant, assurer que toutes les connexions externes ont été déconnecté de l'appareil.

Avertissement

Débrancher la prise de courant avant d'entreprendre aucun travail de réparation de l'appareil.

Batterie Au Lithium Avertissement

Un danger d'explosion existe si la batterie est remplacée incorrectement. Remplacer avec une batterie identique ou similaire, recommandée par le fabriquant. Disposer des batteries utilisées selon la méthode prescrite par le fabriquant.

Ce modèle s'adapte automatiquement au courant électrique ou voltage de la prise murale.

En Europe, brancher l'appareil à la prise murale au moyen d'un fil "HAR" comprenant 3 cables H05VV-F ou H05VVH2-F de 0.75^2mm chacun, avec à une extremité une prise de terre genre SHUCKO et à l'autre une prise IEC 320.

Donnees Techniques

Voltage d'Accès	:	100-240 V∼ −5%, +10%
Courant d'Accès		
Marathon 5K Turbo, 10K, 20K		
NetRunner 500ET, 1000E, 2000E	:	3A-1.5A
Marathon 2K, 2K *Plus*, 3K		
NetRunner 75E	:	2A-1A
STADIA Integration Hub	:	6A-3A
Fréquence	:	47-63 Hz

Notification of FCC Requirements

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications to this product, that could increase the amount of Radio Frequency Emissions from this product, without the expressed written approval of MICOM Communications Corp., could cause the product and the user to violate the FCC's Rules and Regulations, thus requiring the product to be turned off or disconnected.

If this unit is used on a DTE which requires use of shielded cables for compliance with FCC Part 15, then use of a filtered pin connector may be required to maintain FCC compliance. See the Installation section for specific applications.

Notification of Canadian Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

United Kingdom Requirement: Interconnection of Ports Warning

Interconnection directly, or by way of other apparatus, of ports marked "SAFETY WARNING. See instructions for use", with ports marked or not so marked may produce hazardous conditions on the network. The advice of a competent engineer must be obtained before such a connection is made. None of the ports provide isolation sufficient to satisfy the relevant parts of BS 6301. Apparatus connected to the ports, must either have been approved to the relevant parts of BS 6301 or to have been previously evaluated against BS 6301 British Telecom Technical Guides 2 or 26, and given permission to attach. Other usage will invalidate any approval given to this apparatus.

Any or all of the ports on the following modules may be configured as non-network ports:

- Communications Control Modules (CCM): 6 D-type ports
- Up to 4 Channel Expansion Modules (CEM): up to 6 D-type or 12 RJ45 ports
- LAN modules (including RTS, RLB, or IRM): AUI, BNC, and 8-pin modular jack ports
- NMS module: 1 log port, 1 command port
- Up to 4 2-port voice cards
- Alarm port

WARRANTY

MICOM warrants that to the extent that the equipment delivered is hardware, such equipment shall be free from defective material and workmanship for a period of 3 years from the date of shipment of equipment from MICOM when given normal, proper and intended usage. MICOM further agrees to provide, without cost, emergency replacement equipment, shipped freight prepaid, for a period of ninety (90) days from date of shipment of the equipment and factory repair for the remainder of the warranty period provided that:

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(b) The equipment is returned freight prepaid to MICOM;

(c) MICOM's examination of the equipment shall disclose that any defect was not caused by failure of electrical power or air conditioning, damage from lightning or weather-related causes, accident, misuse, neglect, alteration, improper installation, unauthorized repair or improper testing.

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MICOM warrants all out-of-warranty repairs or upgrades performed at its factory location or performed by MICOM Customer Service for a period of 90 days after completion.

Shipping charges must be prepaid.

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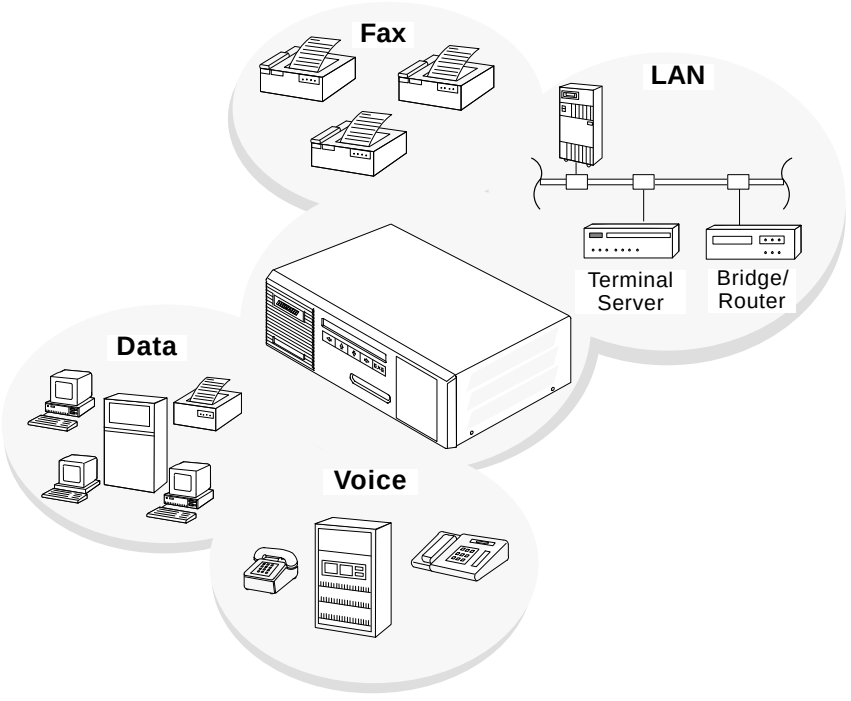
1 Introduction

Both the Marathon and STADIA Integration Hub provide integrated data, voice, fax and LAN access and/or routing in a single unit; they are Integration Products. The key features include the following:

- *MicroBand* ATM networking using Fast Packet and Cell Relay Technology
- Frame Relay networking capability
- Backup Link in the Event of Interconnect Link Failure
- Asynchronous Data Switching and Contention
- Data Compression (both async and sync)
- Software Download via PC or NETMan
- Analog and Digital Voice Switching
- Group 3 Fax Demodulation
- 802.3 Ethernet Remote LAN Bridge/Router
- Remote Terminal Server (for some models)
- Full Network Management Capabilities from a PC (NETMan)
- Redundant Power Supply.



The unit is link compatible with other Integration units (Release 2.5 or higher) and with the following MICOM statistical multiplexers:

- Enhanced Statistical Multiplexer (ESM)
- Enhanced Statistical Synchronous Multiplexer (ESS)
- Fast Statistical Multiplexer (FSM or FSS)
- Fast Statistical Data/Voice Multiplexer (FSV)
- LCi/Val-U-Mux Statistical Multiplexer

This manual covers the following members of the Marathon family:

- Marathon 2K
- Marathon 2K *Plus*
- Marathon 3K
- Marathon 5K Turbo
- Marathon 10K
- Marathon 20K

All of these units' Communications Control Modules, except for the Marathon 3K, are available for inclusion in the STADIA Integration Hub.

Note: When a Marathon 2K CCM is placed in a STADIA Integration Hub, it will support four optional modules (locations B-E).

Upgrade and Compatibility Issues

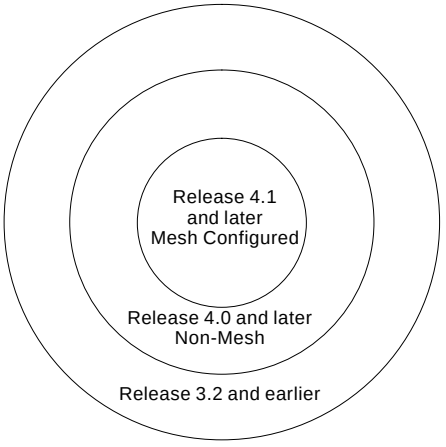
Upgrade Information

	To Release 5.0	
Upgrade From Release...	**Retains previous configratuion?**	**Requirements prior to upgrade**
4.0 and later	Yes	No prior requirements
2.5 – 3.2	Yes	Disconnect all forced connections. After upgrade, reconnect forced connections.
2.0	All except Async Channel Fixed Destination	
1.0	No, completely reconfigure	

Upgrade your network with the central hub unit and work out to the edges of the network without skipping units which are in the direct path.

Compatibility With Other Releases

- CCM Releases 2.5 and later are compatible. Release 2.0 and 1.0 are not compatible.
- Do not partition (separate) Release 4.1 and later units configured for mesh with any non-mesh units. Do not partition any Release 4.0 units with any Release 3.2 and earlier units. Exception: The Marathon 2K is designed to work as a feeder in any Release (2.5 and higher) network.



For additional compatibility information on this release, refer to the Release Notes that accompany this manual.

For information on code download, refer to the Code Download Manual (800-1844).

Manual Conventions

This User's Manual is written to help you address all the features and configurations of the basic unit and the data expansion modules.

- Installation and Cabling Manual covers all the hardware pieces for your unit.
- All optional modules are delivered with manuals which pertain to their individual installation and configuration requirements.
- Companion Command Facility Reference Guide focuses in detail on all menus of the Command Facility (including optional modules and features).
- Menu Flow Diagram shows the Command Facility and LCD/Keypad menus and hierarchy.

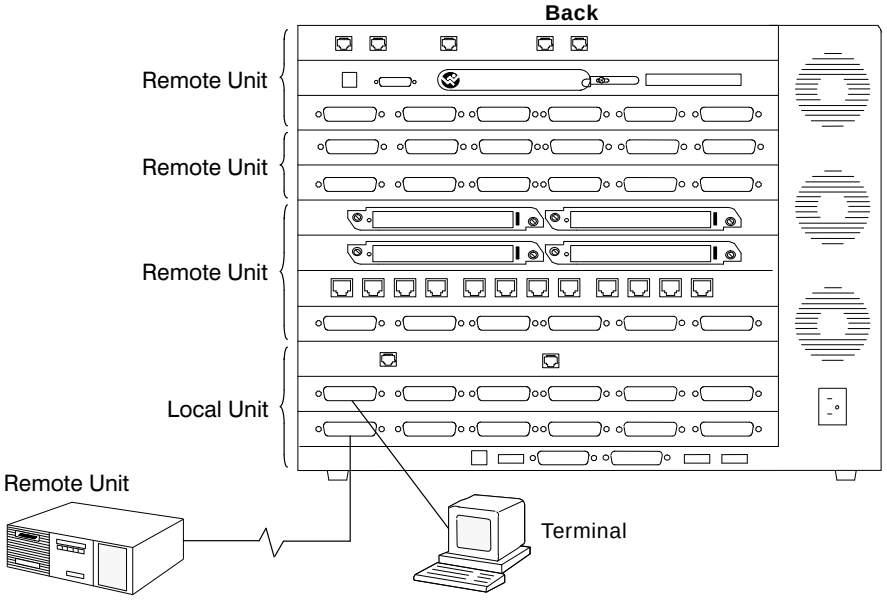
- In this manual, the logical progression dictates that certain portions of menus are accessed at different times; only the applicable Menu portions are discussed. For an explanation of the full menu, refer to the Command Facility Reference Guide.

  1 Where possible, the progression through the menus is shown with the appropriate option numbers.

  In some places no option number is shown but the option name is printed. This is because the option number varies by model. Select the appropriate option name from the menu.

Note: The examples and illustrations used in this manual may not match your physical unit.

- The Marathon 3K base module is a combination of the Communications Control Module and voice. This manual addresses the Communications Control Module portion of the base module. The voice portion of the Marathon 3K is addressed in the 3K Voice Manual (part number 800-1856).
- The term *unit* refers to the Marathon unit or a single Communications Control Module in the STADIA Integration Hub. In the Integration Hub, you may have up to four units (four Communications Control Modules and their associated modules).



Note: When a terminal is directly connected to a unit and it is accessing the Command Facility of that unit, that unit becomes the *local unit*.

Initial Configuration 2

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This section introduces the Command Mode and Command Facility, and discusses naming and numbering your local node. This is necessary before proceeding to the next section, Link Configuration.

Note

The defaults discussed in this and future sections are factory defaults. If your unit has been pre-configured by your distributor, it may not match the defaults listed here.

This section assumes that you have unpacked and installed your unit per the Installation and Cabling Manual.

Menu Conventions

The features and functions are accessed through the menu-driven Command Facility.

In the Command Facility, parameters remain at their most recent set values. If these parameters have never been configured, the values are the factory defaults, which can be found in Appendix A. The Command Facility Reference Guide documents each menu and option within the Command Mode and Command Facility.

Menu Format

Menus displayed in the Command Facility are generally formatted as shown.

```
HEADING [node ID]

    1.  FIRST OPTION NAME
    2.  SECOND OPTION NAME

CR   –  ACCEPT ENTRY
M    –  MAIN MENU

ENTRY:
```

```
HEADING [node ID/channel]:

    1.  FIRST OPTION         [current value]
    2.  SECOND OPTION        [current value]

CR   -  ACCEPT ENTRY
M    -  MAIN MENU

ENTRY:
```

```
HEADING [current value]:

    1.  FIRST OPTION NAME
    2.  SECOND OPTION NAME

CR   -  ACCEPT ENTRY
M    -  MAIN MENU
N    -  NEXT MENU

ENTRY:
```

Menu Nomenclature

Enter		The Enter key (return key on some keyboards) is used to accept a selection.
N	Next Menu	The value selection menus offer the ability of moving from one option to the next without returning to the menu each time. If this capability is available, it will show on the menu.
M	Main Menu	When used without a option number, pressing **M** returns the user to the Command Facility Main Menu without making any changes at the level of the existing menu. Where prompts request a numeric input, an **M** will return to the previous step without effecting changes. The exception to this is where the phrase `^X TO ABORT` is displayed. In this case, simultaneously press the control key and the **X** key.
P	Previous Menu	When displayed in the menu, the selection returns you to the previous menu rather than the Main Menu.
^	Control Key	The caret symbol is used to represent the control key on the keyboard. For instance, **^X ^Y** means press the control key and **X** simultaneously, followed by the control key and **Y** simultaneously.
<break>		This represents the BREAK key on the keyboard.
<esc>		This represents the ESCAPE key on the keyboard.
n/a		Not applicable.

Command Mode

The Command Mode is a single menu which supports configuration and testing of the local port (the one to which you are connected) and access to the Command Facility.

Note: At any time, two async ports plus the Command Port (on the optional NMS module) may access the Command Mode.

Entering the Command Mode

The Command Mode is accessible from any of the async ports local to that Communications Control Module (CCM).

First Time Access to the Command Mode: Set the terminal to the settings shown below.

Async Terminal Settings

Data Rate	9600
Code Level	8 bits per character
Stop Bits	1
Parity	None
Operation	Full-Duplex

After the initial connection to the Command Mode, the terminal parameters (except Operation) may be reconfigured. Once the new parameters are selected, exit the Command Mode by entering **<break>**. The new parameters will now be in effect. Set the terminal to the new parameters and reenter the Command Mode, if desired.

To Enter Command Mode

Press **^X** then **<break>**

The Command Mode menu is displayed.

```
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COMMAND MODE: CHANNEL

    1.  ASYNC CHANNEL LOOPBACK
    2.  LOCAL CHANNEL CONFIGURATION
    3.  COMMAND FACILITY MAIN MENU
    4.  EXIT
```

The Command Mode offers four options:

- Async Channel Loopback: Contains a selection of loopback tests (Refer to Section 7).
- Local Channel Configuration: Provides control and modification of the local port only.
- Command Facility Main Menu: Provides access to the local unit's Command Facility.

```
ENTER PASSWORD: Enter
```

- Exit: Disconnects the terminal from the Command Mode.

To Exit Command Mode

Either

- select option 4, Exit, or
- press **<break>**.

The `COMMAND MODE DISCONNECT` message is displayed.

Local Channel Configuration

Intended for changing parameters on the port to which you are attached, use the following path to access the menu.

```
                1996 MICOM COMMUNICATIONS CORP.
                      ALL RIGHTS RESERVED
              UNPUBLISHED - RIGHTS RESERVED UNDER THE
                COPYRIGHT LAWS OF THE UNITED STATES.

      2       LOCAL CHANNEL CONFIGURATION
```

Option	Default	Description
1. Data Rate	9600	Data rate in bps (bits per second).
2. Code Level	8	Number of data bits per character.
3. Parity	None	Depending on code level chosen, one of two menus will appear.
4. Stop Bits	1	Number of stop bits inserted at the end of a data character.
5. Echo	Off	Turns the echo function on or off.
6. CR Delay[1]	0	Carriage return delay.
7. LF Delay[1]	0	Line feed delay.
8. FF Delay[1]	0	Form feed delay.

Note: To ascertain the correct configuration values, consult the user manual of the device connected to the port.

For ports connected via dial-up modems, parameters remain in effect only for the duration of the call.

For directly connected ports, the parameter changes remain in effect until changed in this menu or in the Channel Characteristics (of the Async Channel) menu.

Important

Be sure your terminal is reconfigured to match the new local channel configuration.

[1] Delay values are configured in number of characters (0-99) to account for required mechanical actions of the equipment attached to the port.

Command Facility

The Command Facility is intended for use by the system administrator. It contains the configuration, diagnostic and system administration options for all ports of the unit. Only one port may access the Command Facility at a time.

To Enter Command Facility Either

- Use the Command Facility Main Menu option of the Command Mode menu

  or

- Enter *$CMD* of the ENTER CLASS prompt[1]. (This method bypasses the Command Mode menu and directly enters you into the Command Facility Main Menu.)

Note: The terminal accessing the Command Facility Main Menu must have the Command Facility Main Menu Access function enabled (factory default).

The screen will display a prompt requesting a password, if password protection has been configured (by default there is none). (The Global password is required to access the configuration functions, refer to page 6-10.) Figure 2-1 shows the different options in the Command Facility and where each option is discussed in this manual.

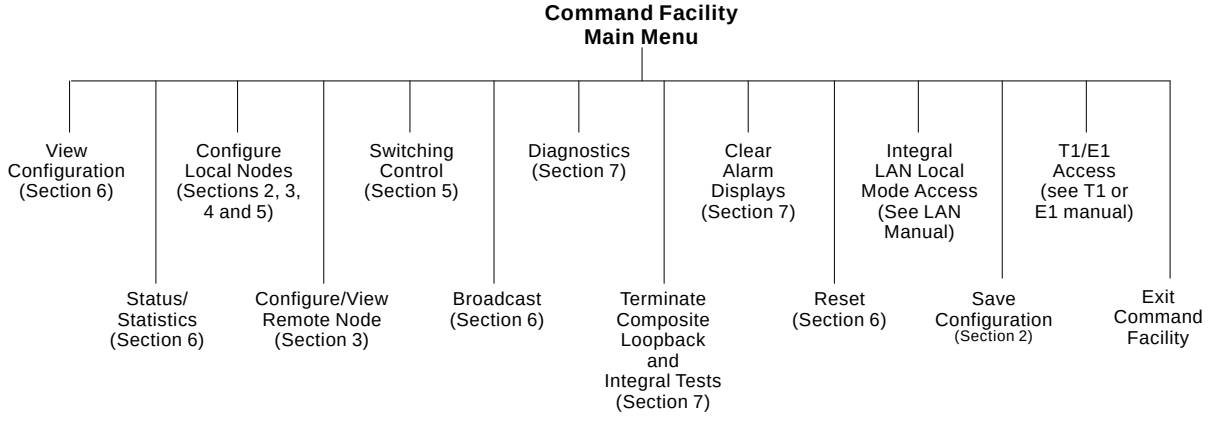

Command Facility Main Menu
View Configuration (Section 6)
Configure Local Nodes (Sections 2, 3, 4 and 5)
Switching Control (Section 5)
Diagnostics (Section 7)
Clear Alarm Displays (Section 7)
Integral LAN Local Mode Access (See LAN Manual)
T1/E1 Access (see T1 or E1 manual)
Status/ Statistics (Section 6)
Configure/View Remote Node (Section 3)
Broadcast (Section 6)
Terminate Composite Loopback and Integral Tests (Section 7)
Reset (Section 6)
Save Configuration (Section 2)
Exit Command Facility

Figure 2-1. Command Facility Block Diagram

To Exit Command Facility Either,

- select the Exit option

  or

- press **<break>**.

[1] The Enter Class prompt is a configurable dialog message. If it has not been configured differently, it will display ENTER CLASS:.

Save Configuration (Marathon 3K only)

The save configuration option must be selected whenever there are *any* configuration changes made to the unit. This option saves the configuration to the Flash memory.

Configure Local Node

Select the Configure Local Nodes option from the Command Facility Main Menu. The options and their locations in this manual are illustrated in Figure 2-2.

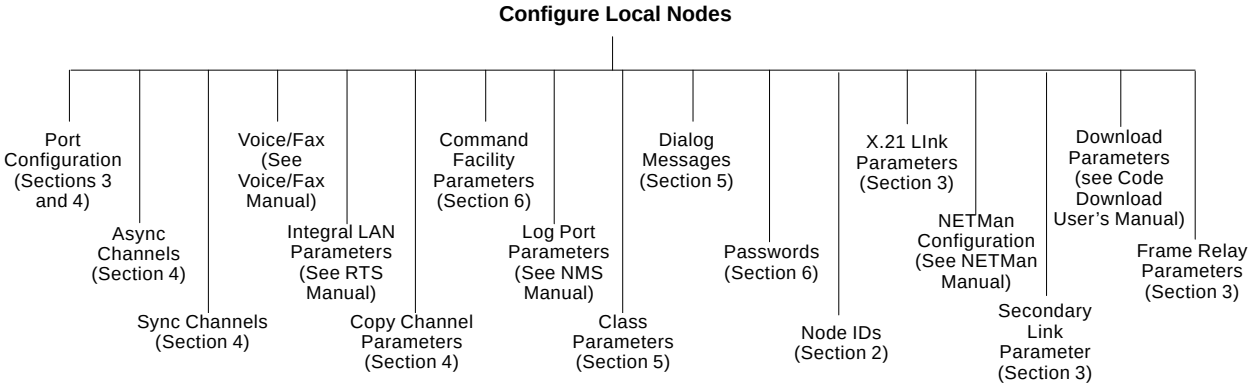

Configure Local Nodes
Port Configuration (Sections 3 and 4)
Async Channels (Section 4)
Sync Channels (Section 4)
Voice/Fax (See Voice/Fax Manual)
Integral LAN Parameters (See RTS Manual)
Copy Channel Parameters (Section 4)
Command Facility Parameters (Section 6)
Log Port Parameters (See NMS Manual)
Class Parameters (Section 5)
Dialog Messages (Section 5)
Passwords (Section 6)
Node IDs (Section 2)
X.21 LInk Parameters (Section 3)
NETMan Configuration (See NETMan Manual)
Secondary Link Parameter (Section 3)
Download Parameters (see Code Download User's Manual)
Frame Relay Parameters (Section 3)

Figure 2-2. Configure Local Nodes Menu Block Diagram

Node Number And Name (ID)

Before doing any configuration, *it is important* to renumber and rename the local node.

Node Syntax Information

Node Number Syntax	Node numbers may be 1-254. It is not necessary to place 0s to hold spaces; the number 1 is input as 1 and not 001. (The default is 240[1])
Node ID (Name) Syntax	Node ID (names) may be up to eight (8) characters long. Only alpha characters (a-z, A-Z), numeric characters (0–9), and the underbar symbol (_) can be used; spaces cannot be used. The first character must be an alpha character. Names are not case sensitive; therefore New_York, new_york, and NEW_YORK are the same name. The default is !240[1].)

Note: It is recommended that the node ID be kept short for ease of operation.

[1] If you have an NMS module, the node number and ID may be programmed by switches (refer to the NMS Manual). Not applicable to 3-slot Chassis units.

Node Numbering and Naming from the Command Facility

Note: If you are configuring a network with a Real Time Clock, you may wish to review pages 2-10–2-11 before selecting your node number.

```
COMMAND FACILITY MAIN MENU [node ID]

 3    CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES [node ID]

      NODE IDS
```

Option number may vary depending on model.

```
 NODE ID CONFIGURATION

 1     LOCAL NODE
```

```
        ENTER NODE ID # [current value]: 100
```

Enter the planned node ID. For example, NODE_A.

```
ENTER NODE ID (^X TO ABORT) [current value]: NODE_A
```

```
**SELECT "Y" TO RESET SYSTEM WHEN NODE CHANGES MADE**
ENTER "Y" TO RESET "C" TO CONTINUE: Y
```

Y = forces the reset; completes the node configuration process

C = returns you to the Node ID Configuration menu.

Note: If you select **C**, your configuration is placed into *temporary storage* so that you can continue to configure additional node IDs for MICOM muxes. When this is complete, select the reset by pressing **Y.**

CAUTION

Should you configure a node ID, press **C** and then exit the Node ID menu, your new configuration will be lost. The old node ID(s) will remain intact.

The Mux Link Node(s) option is addressed in Section 3, Link Configuration.

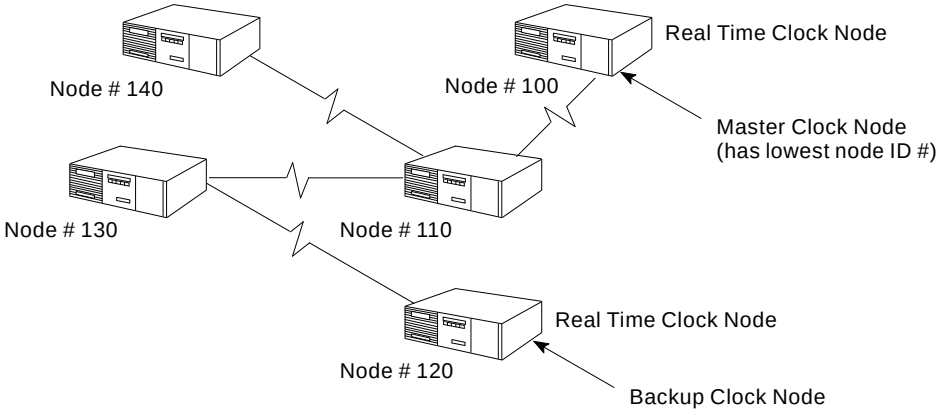
Real Time Clock

If your unit has a Real Time Clock[1] installed, it may provide time, day and date information to your network. This is valuable if you are going to use the Time of Day Bandwidth on Demand features.

Master Clock Node

If the network has a real time clock installed in one or more units, one serves as the master clock in the network and the others serve as the backup in the event of node or link failure.

- *Master clock node:* The node with the lowest node number containing the Real Time Clock functionality establishes the network time. It provides time broadcasts to the rest of the network[2] at two minute intervals.
- *In the event of master clock failure:* Should the master node be unable to broadcast the time within 4 minutes, the next lowest numbered node in the network with a Real Time Clock will assume the responsibility of transmitting the time until the previous master clock node returns to the network.



Reset

In the event of a reset the network will re-establish the master clock, and it will establish the time for the network.

Other Nodes in the Network

- *Non-Real Time Clock nodes* receive the time update and set their clocks to the specified network time.
- A node with a Real Time Clock installed will receive the time from the master clock and will not broadcast its time. In the event that it does not receive a broadcast within 4 minutes of the previous broadcast, each node with a Real Time Clock will begin transmitting its own time until a new master clock is established (lowest node ID number working in the network).

[1] On the 5000NMS/CE/RTC NMS Module or on the Marathon 3K in the optional SIMM.
[2] Only units with Release 5.0 and later will accept this broadcast.

Configuring the Day, Date and Time for the Network

You do not need a unit with the Real Time Clock. If you are using a Real Time Clock, select any unit in the network that is Release 5.0 or later. Access the Command Facility Parameters Menu using the following path:

```
COMMAND FACILITY MAIN MENU
  3   CONFIGURE LOCAL NODES
```

Option number varies, depending on model.

```
CONFIGURE LOCAL NODES
      COMMAND FACILITY PARAMETERS
```

Day of The Week option number varies, depending on model.

```
COMMAND FACILITY PARAMETERS
  1   TIME
  2   DATE
      .
      .
      .
      DAY OF THE WEEK
```

Time: At the `ENTER TIME [hh:mm:ss]:` prompt, enter the correct time using 24-hour time. Be sure to use colons between hours, minutes and seconds.

Example:
1:06 pm would be 13:06:00
5:45 pm would be 17:45:00
1:06 am would be 01:06:00

Date: At the `ENTER DATE [mm/dd/yy]:` prompt, enter the correct date by month/day/and year.

Example:
December 1, 1996 would be 12/01/96
January 15, 1997 would be 01/15/97

Day of the Week: Select the current day from the following menu:

```
DAY OF THE WEEK
    1.  SUNDAY
    2.  MONDAY
    3.  TUESDAY
    4.  WEDNESDAY
    5.  THURSDAY
    6.  FRIDAY
    7.  SATURDAY
```

Channel Syntax Information

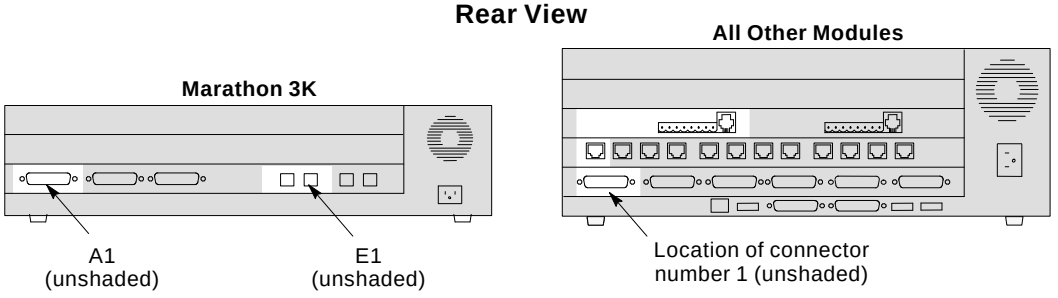
Channel Number Syntax

Channel numbers are assigned to *all* the ports on the local unit. The Communications Control Module (CCM) module is always module location A. From left to right these are numbered sequentially. The channel numbers correspond to the module and connector locations (ports).

The same is generally true for all the other modules. The first connector, regardless of the type, on the left side is connector number 1. If this connector is on the module in location B, the channel number is B1. If the connector is on module C, the channel number is C1, and so forth.

Notes:

- *On the Marathon 2K*, there will only be location A-C, with location A being the Communications Control Module.
- *On the Marathon 3K*, the Communications Control Module portion of the base module is location A; the voice portion is mapped to location E. Location D is not used.



MICOM Mux Channel Syntax — MICOM mux ports are numbered 1 through 32 sequentially.

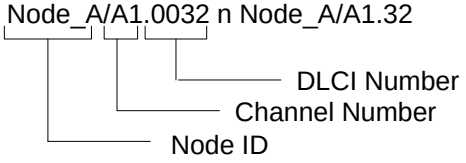
Node ID/ Channel # Syntax — Node ID, a slash, and the channel number. The slash, a separator (delimiter) between the node ID and channel, *must* be there. (Examples: NEW_YORK/A5 is port 5 of module A on the new_york node. DALLAS/10 is port 10 on the dallas MICOM-mux node.)

Range of Channels Syntax — You may access more than one port on the same node. To access a specified range of channels (C4-D8) on the unit identified by the ID of NODE_A, you would type the following:

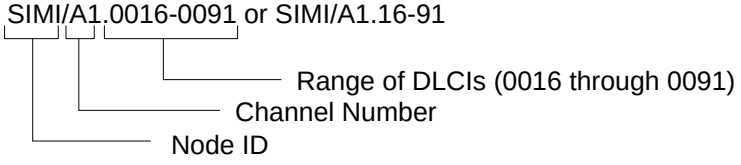
```
NODE_A/C4-D8
```

Note: In all cases, the syntax input is not case sensitive.

DLCI Syntax — The DLCI number is added at the end of the channel numbers. For example:

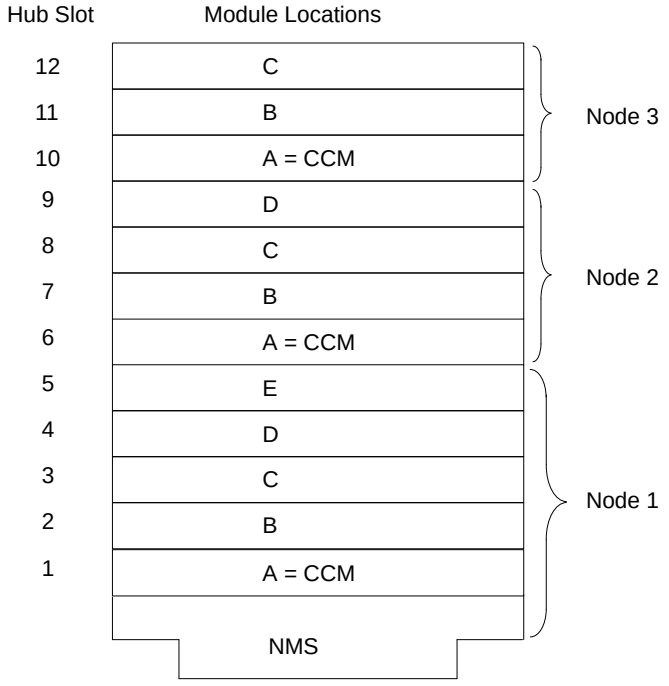


Range of DLCI Syntax: — A range of DLCI may be specified as follows:



Module Locations for the STADIA Integration Hub

In the Integration Hub, the module locations are determined by the CCM. If the module is the next module above the Communications Control Module (CCM), it is in module location B. The one above that is location C and so forth to location E. This is true regardless of the physical location of the CCM (the Hub slot it is in). In the illustration below, the Integration Hub has three CCMs and their associated modules. Refer to the Installation and Cabling Manual for a more detailed description on module stacking.



Link Configuration 3

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The Integration unit offers the ability to connect to one of the following units by means of its associated links:

Type of Unit	Type of Link
• Any Integration Unit	Interconnect, Frame Relay Link[1], or Secondary Interconnect[2] Link
• Co-located Marathon 5K Turbo, 10K[3] or 20K	Local Interconnect Link
• MICOM Mux (MICOM BOX and LCi/Val-U-Mux)	Mux Link or X.21 Link

Appendix B offers a worksheet for recording your node configuration.

[1] Release 4.2 and later.
[2] Release 3.1 and later.
[3] Release 3.2 and later.

Network Design

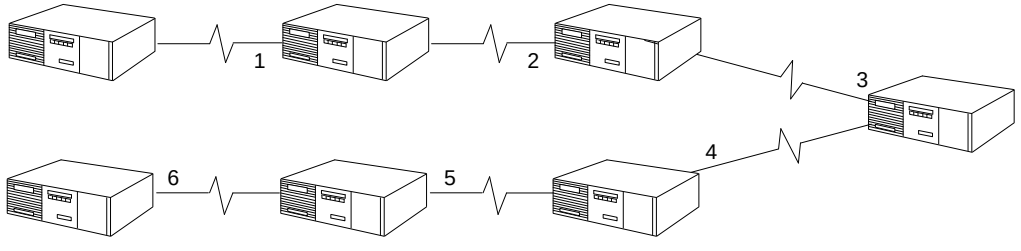
The unit supports the following five types of topologies:

- Point-to-point
- String[1]
- Star[1]
- Distributed Star[1]
- Delta, Ring or Mesh[1]

The Marathon 5K Turbo, 10K and 20K can serve as either a *terminated node* (traffic is terminated in, or attached to the local node) or a *switching hub* (no locally attached devices). The Marathon 2K, 2K *Plus* and 3K are designed as feeders to a switched hub. Without local legacy traffic (data/voice/LAN), the link capacity increases. The following elements are to be considered when putting together a network:

	Marathon				
	2K, 2K *Plus*	**3K**	**5K Turbo**	**10K**	**20K**
• Link Capacity (non-frame relay)					
Terminated	**64 Kbps**	**128 Kbps**	**148 Kbps**	**128 Kbps**	**256 Kbps**
Switched	**n/a**	**n/a**	**148 Kbps**	**192 Kbps**	**384 Kbps**
• Delay (varies between channel type and protocol)	Due to delays, do not exceed six link hops in any network path shown below for units with voice/fax modules. Limit the link hops to three (four nodes total) if you are configuring *dynamic rate adaption* on your voice/fax module.				

Note: Frame relay can be clocked to T1 rates. V.35 is required for higher rates.



Example of a 6-Node Hop

[1] On Marathon 2K, 2K *Plus* and 3K these applications are supported in Frame Relay only.

Order of Links (Marathon 5K Turbo, 10K and 20K)

For optimal performance, highest speed links (interconnect, frame relay, local interconnect and secondary interconnect) should be configured on the lower-most channels (i.e., A1, A2), followed by low-speed interconnect links (interconnect, local interconnect and secondary interconnect), mux links, X.21 links, and data channels (sync, async, voice and LAN).

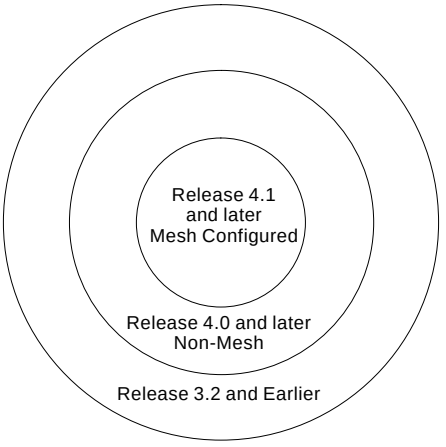
Exceptions

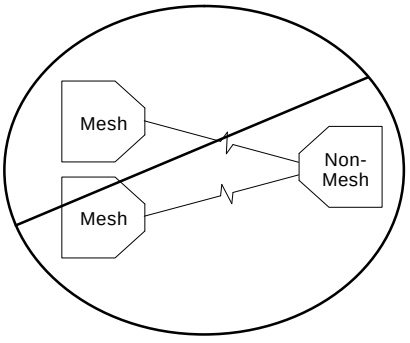
- If an integral DSU/CSU is installed in the chassis, it will map to A1 and/or A2, forcing high speed local interconnect links to A3 and higher.
- If interconnect links are configured on the 5000E/6DMA module, they must not exceed the available aggregate. In this case, interconnect links may follow mux or X.21 links.

Placement in a Network

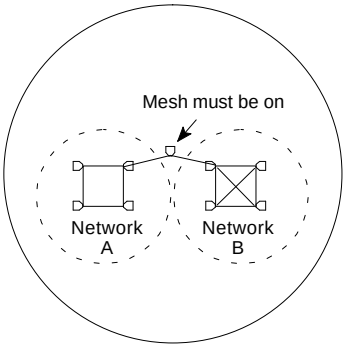
- Release 4.1 and later mesh: configure for mesh in the hub of the network. Configure mesh for,
  - Units with closed loops
  - Units connecting between two mesh networks
- Generally keep *like types* together. Do not partition (separate) units with earlier revisions.

  Exception – A Marathon 2K, 2K *Plus* or 3K may be attached at an end point of a Release 3.2 network.





Note: Do not partition (separate) mesh units with non-mesh units.

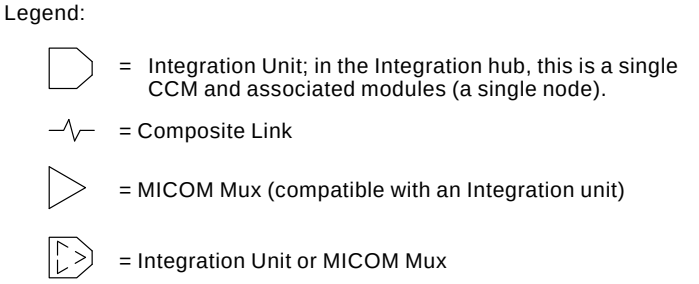


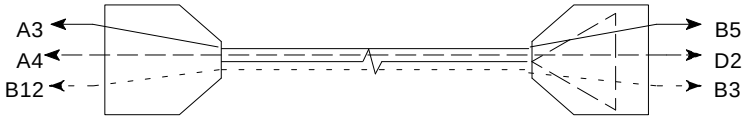
The example shows two mesh networks (A and B) connected by a single unit. In order for the two networks to communicate, the *connecting node(s)* must also have mesh turned on (page 3-7).

Topologies

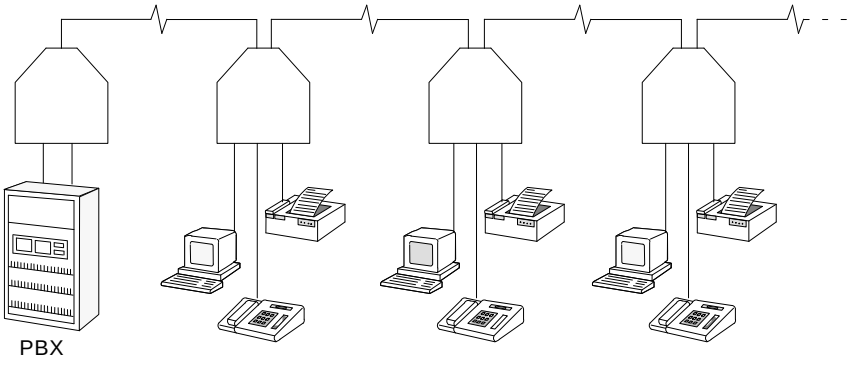
In the following pages several topologies are shown. Due to the flexibility of the unit, a variety of configurations are available. MICOM recommends that you work with your MICOM Certified Distributor to ensure that the unit meets the requirements of your network in the most effective and cost-efficient manner.

The illustrations in this section contain the following four symbols:

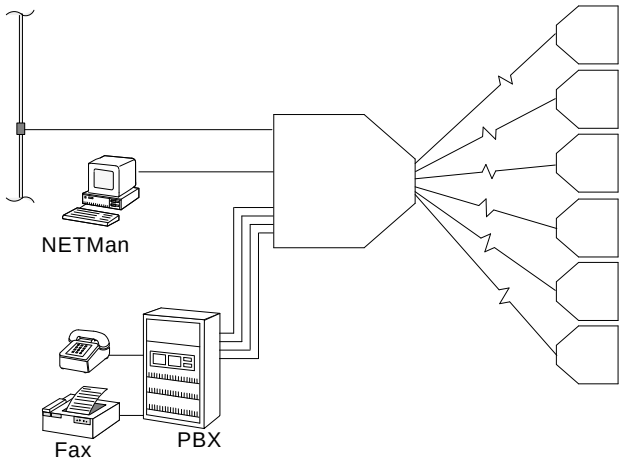

Legend:
= Integration Unit; in the Integration hub, this is a single CCM and associated modules (a single node).
= Composite Link
= MICOM Mux (compatible with an Integration unit)
= Integration Unit or MICOM Mux



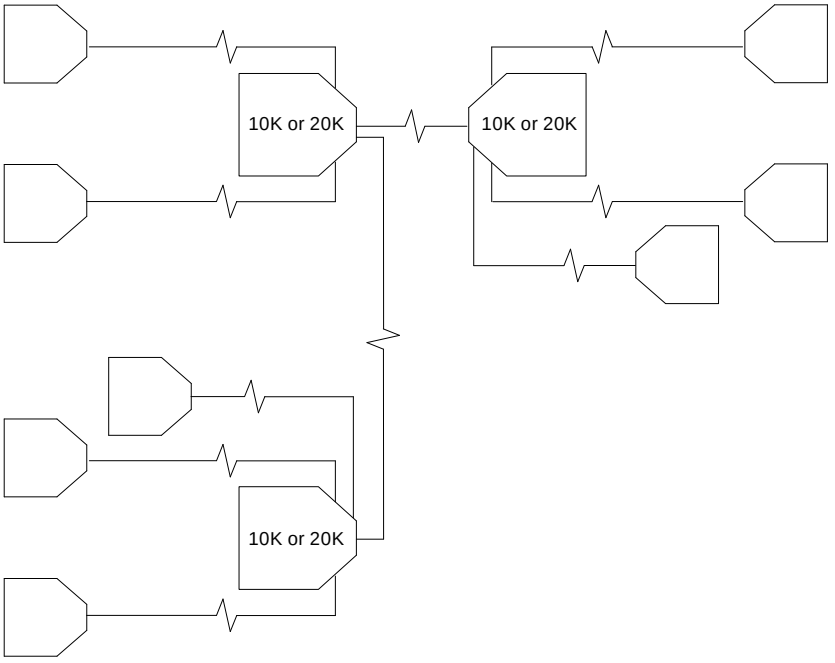
Point-to-Point Switching Topology



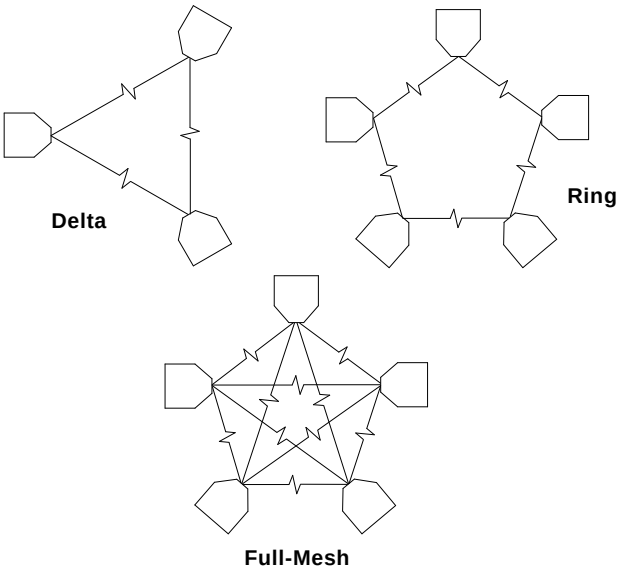
Typical String Network



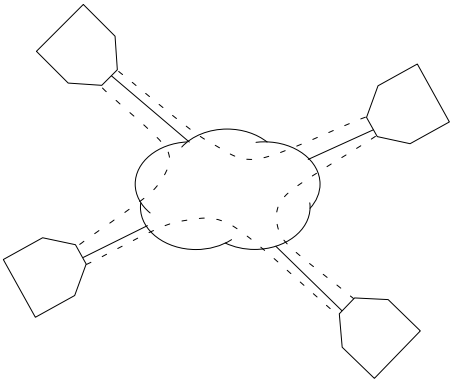
Typical Star Application for the Marathon 10K or 20K Operating Interconnect Links



Typical Distributed Star Application for the Marathon 10K or 20K



Delta, Ring and Mesh Applications



Frame Relay Link

PVC

Frame Relay Connectivity

Configuring a Mesh Node

There are two network types: mesh and non-mesh.

Non-Mesh (Mesh Off)	Recommended for all units operating without closed loops. This is the default.
Mesh (Mesh On)	For all units utilizing a closed-loop topology (connected in a network with more than one pathway) and units in between closed loop networks.

- Each unit required to run mesh or connecting units between mesh networks must have mesh enabled (*on*)
- When configuring mesh, start on a hub unit (central unit) and work out to the edges of the network without skipping any unit in the direct path (no mesh units may be separated by a non-mesh unit). The units may remain connected, but the network traffic will be interrupted until the units are properly configured and reset.
- Your unit must have at least
  - one link configured as frame relay
  - more than one interconnect link configured.

To enable the mesh feature, use the following path:

Option numbers vary depending on the model

```
CONFIGURE LOCAL NODES
   [ ]  NODE IDS

NODE ID CONFIGURATION
   [3]  MESH ROUTER

MESH ROUTER
   [1]  ON

        ENTER "Y" TO RESET "C" TO CONTINUE:
```

Press Y which will force the reset. If you select C the change will not take effect.

Important

The `DUPLICATE NODE-ID` message will *very briefly* display if there are units within the network which should be configured for mesh and they are currently configured as non-mesh. (This is assuming that all the nodes have already been given unique names at the Node IDs menu.) Do not place a network in service that displays this message as some nodes may not be recognized.

Port Configuration

Table 3-1. Port Configuration and Defaults

Port (Channel) Number	Default	Possible Port Configuration				
		Marathon 2K and 2K *Plus*	**Marathon 3K**	**Marathon 5K Turbo**	**Marathon 10K**	**Marathon 20K**
A1	Interconnect Link	Interconnect, Frame Relay, Mux or X.21 Link	Interconnect or Frame Relay Link	Interconnect, Secondary Interconnect, Local Interconnect, Frame Relay, Mux or X.21 Link		
A2	Async	Secondary Interconnect[1] or Frame Relay Link; Sync[1] or Async		Interconnect, Secondary Interconnect, Local Interconnect, Frame Relay, Mux or X.21 Link; Sync or Async		
A3	Async	Async or Sync[2]	Async or Sync	Interconnect[3], Frame Relay, Secondary Interconnect, Mux or X.21 Link; Sync or Async	Interconnect, Frame Relay, Secondary Interconnect, Local Interconnect, Mux or X.21 Link; Sync or Async	
A4	Async	Async	n/a	Frame Relay, Secondary Interconnect, Mux or X.21 Link; Sync or Async		
A5	Async	Async	n/a	Mux or X.21 Link; Sync or Async		
A6	Async	Async	n/a	Sync or Async	Interconnect, Frame Relay, Secondary Interconnect, Local Interconnect Link; Sync or Async	
B1-B6[4]	Async	n/a	n/a	n/a	Interconnect, Secondary Interconnect, or Local Interconnect Link; Sync or Async	
B1-D12[5]	Async	Async	Async	**Sync[6] or Async**		

1 Port A2 may be configured as an interconnect link for connection to a secondary interconnect link at the remote end. This link will activate only if the link on A1 is non-operational.

2 On Marathon 2K, either A2 or A3 may be sync. Only one port at a time may operate sync. If A2 is configured for sync, then A3 cannot be configured for sync and vice versa.

3 If A1 and A2 are utilizing 56-64 Kbps link bandwidth, A3 must use a rate not to exceed 19.2 Kbps. Do not exceed 148 Kbps total link bandwidth.

4 With 5000E/6DMA Module installed (Marathon 10K and 20K only).

5 Units in a 3-slot chassis do not have a module location D, only B1-C12 are possible.

6 Sync channel available only on the 5000E/6 (and 5000E/6DMA for Marathon 10K and 20K).

Follow this path of menus to configure the port:

```
COMMAND FACILITY MAIN MENU

 3   CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES

 1   PORT CONFIGURATION
```

Type the node ID, a slash, followed by the channel number. Then press Enter .

```
ENTER NODE ID/CHANNEL # (^X TO ABORT): NODE_A/A2
```

Options vary, depending on model. Refer to Table 3-1 for your unit's options.

```
PORT CONFIGURATION
     1.  ASYNC
     2.  SYNC
     3.  INTERCONNECT LINK
     4.  LOCAL INTERCONNECT LINK
     5.  SECONDARY INTERCONNECT LINK
     6.  MUX LINK
     7.  X.21 LINK
     8.  FRAME RELAY LINK
```

This menu assigns a particular channel or link type to the port. Not all link options are supported on all models. Refer to Table 3-1 for your specific model. The option numbers will vary depending on the model.

Option[1]	Description
1. Async	For all async data channels (refer to Section 4).
2. Sync	For all sync data channels (refer to Section 4).
3. Interconnect Link	For connecting to another unit (refer to page 3-10).
4. Local Interconnect Link	For connecting to another Integration unit (Marathon 5K Turbo, 10K or 20K) co-located (refer to page 3-12).
5. Secondary Interconnect Link	For a backup link to another Integration interconnect link (refer to page 3-14).
6. Mux Link	For connecting to a MICOM mux over a leased line (refer to page 3-40).
7. X.21 Link	For connecting to a MICOM mux over an X.21 link (refer to page 3-42).
8. Frame Relay Link	For connecting to a frame relay service (refer to page 3-27).

Note: The total number of DLCIs and links (all types) varies depending on model (refer to page 3-28).

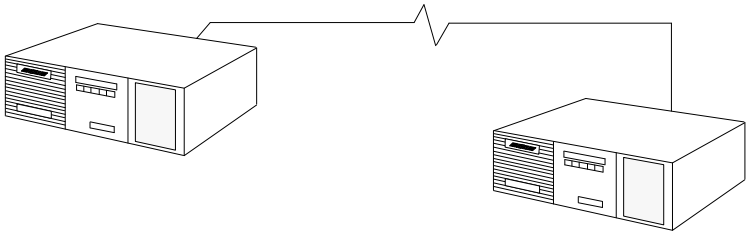
Important

The unit ***must*** be node reset (to *current configuration*) after port configuration is complete. Refer to page 6-2.

[1] Option numbers vary depending on the model.

Interconnect Link

The interconnect link is for connection to another unit at a remote location. The number of interconnect links available depends upon your model. Refer to Table 3-1, on page 3-8 for information on which ports may be configured as an interconnect link.



In the following example, A2 of Node_A is to be configured as an interconnect link. The steps include configuring the port for interconnect link, setting the clocking and resetting the node.

Access Port Configuration menu

```
COMMAND FACILITY MAIN MENU
  3   CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES
  1   PORT CONFIGURATION
```

```
ENTER NODE-ID/CHANNEL # (^X TO ABORT): NODE_A/A2
```

Configure Interconnect Link

```
PORT CONFIGURATION
  3   INTERCONNECT LINK
```

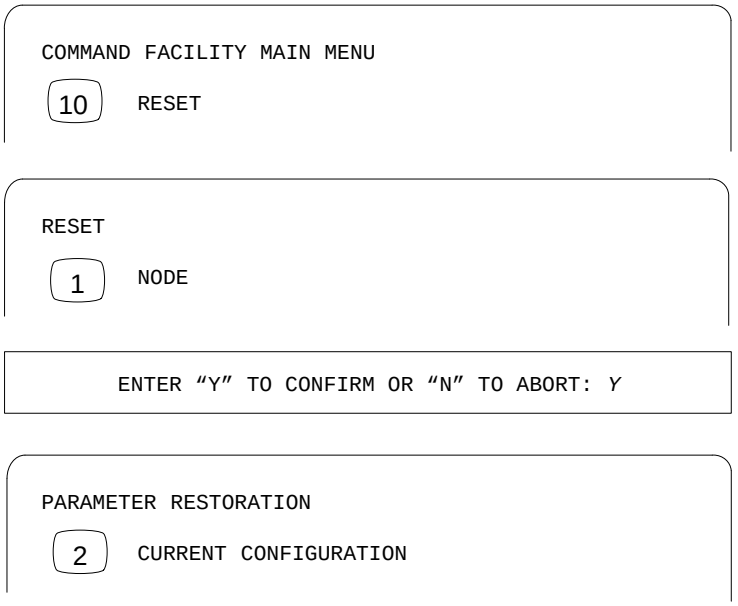
Set Clocking (see Clocking Options.)

```
SET LINK RATE
  1   SYNC EXTERNAL CLOCKS
```

Return to Main menu

```
CONFIGURE LOCAL NODES
        ENTRY: M
```

Reset Node



Interconnect Link Clocking Options

When option 3 is selected from the Port Configuration menu, the Set Link Rate menu displays with the following clocking options:

1. Sync External Clocks — Connect via communications device. Most common application.

2. 2400 Sync Internal Clocks
3. 4800 Sync Internal Clocks
4. 9600 Sync Internal Clocks
5. 12000 Sync Internal Clocks
6. 14400 Sync Internal Clocks
7. 16800 Sync Internal Clocks
8. 19200 Sync Internal Clocks
9. 38400 Sync Internal Clocks
10. 56000 Sync Internal Clocks
11. 64000 Sync Internal Clocks

Connection back to back (no communication device) or for providing clocking to a device (i.e., channel bank). Used when units are within a close proximity. It is recommended that a frame relay link be used instead of interconnect link for permanent connections.

Assuming that you have installed and configured the communications device for the interconnect link (either a modem or ISU, integral or external), connect the interconnect cable. The integrity of the link is verified by observing that the indicator light goes off on the port being used (A1-B6).

Local Interconnect Link

The local interconnect link feature permits you to connect two or more units. These units may be Marathon 5K Turbo, 10K[1] or 20K located within a close proximity (co-located). This particular link increases backbone capacity for critical applications such as voice switching.

- On units with terminated traffic (directly attached terminals, hosts or voice/fax modules), it is recommended that local interconnect links (at 252 Kbps) be restricted to two links.
- One half of the configured bandwidth is available for rated traffic (voice and sync data); the remaining bandwidth is reserved for unrated traffic (LAN or async). The maximum amount of composite utilization will never exceed 87% (as viewed in the Demand Report).
- Load sharing is not a supported application.
- When using a MICOM cable, the distance between units should not exceed 25 feet (8 meters) on higher data rates when internally clocked. Shorter distances may be required when using other cables or clocking externally.
- If utilizing a campus-type private wire application, you may connect a communications device and configure for external clocking. In this application, additional cable length restrictions may apply depending on devices and cables. High speed converters may be required.
- *Do not use local interconnect links for WAN communications*; the unit does not support that application.

To configure a local interconnect link, use the following path:

```
COMMAND FACILITY MAIN MENU
 3   CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES
 1   PORT CONFIGURATION
```

```
ENTER NODE-ID/CHANNEL # (^X TO ABORT): NODE_A/A3
```

```
PORT CONFIGURATION
 4   LOCAL INTERCONNECT LINK
```

[1] Requires a Marathon 10K CCM, Rev. E or later with Release 3.2 or later software.

Set each end of the link for the same speed (they must match).

```
SET LINK RATE
    1.  SYNC EXTERNAL CLOCKS
    2.  64000 SYNC INTERNAL CLOCKS
    3.  126000 SYNC INTERNAL CLOCKS
    4.  192000 SYNC INTERNAL CLOCKS
    5.  252000 SYNC INTERNAL CLOCKS
```

Return to Main menu

```
CONFIGURE LOCAL NODES

       ENTRY: M
```

Reset the Unit

```
COMMAND FACILITY MAIN MENU

 10    RESET
```

```
RESET

  1    NODE
```

```
   ENTER "Y" TO CONFIRM OR "N" TO ABORT: Y
```

```
PARAMETER RESTORATION

  2    CURRENT CONFIGURATION
```

Set Link Rate Menu

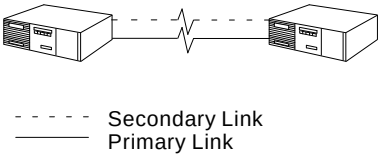
The Set Link Rate menu displays when you select the local interconnect link option and it offers the following options:

1. Sync External Clocks — Supports campus (private wire) applications. An external device (modem, DSU/CSU) will provide the clocking.
2. 64000 Sync Internal Clocks
3. 126000 Sync Internal Clocks
4. 192000 Sync Internal Clocks
5. 252000 Sync Internal Clocks

Bandwidth On Demand

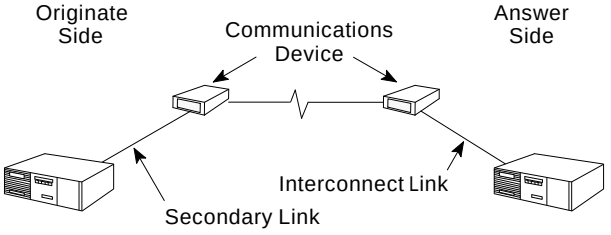
Bandwidth on Demand is a feature of providing additional bandwidth into a networking environment thereby providing additional network traffic capacity as required. The extra capacity can be provided by an additional interconnect link or more likely, a secondary link. In addition, Bandwidth On Demand offers the Time of Day feature which ensures that additional bandwidth will only be available during certain time periods. The following two sections, Secondary Link and Time of Day discuss the features and configuration of Bandwidth On Demand in greater detail.

Secondary Interconnect Link



The secondary link operates in conjunction with a primary interconnect link to provide link redundancy in the event of link failure or over utilization (assuming power and telephone communications are maintained). An interconnect link is considered a *primary* interconnect link if it has an associated secondary link. Refer to Table 3-1 on page 3-8 to ascertain which ports can be configured as a secondary link for your model.

A port is configured as a secondary interconnect link only at the side of the link that will initiate the call (originate). At the answer side of the link (the one receiving the call), configure the port as an interconnect link.

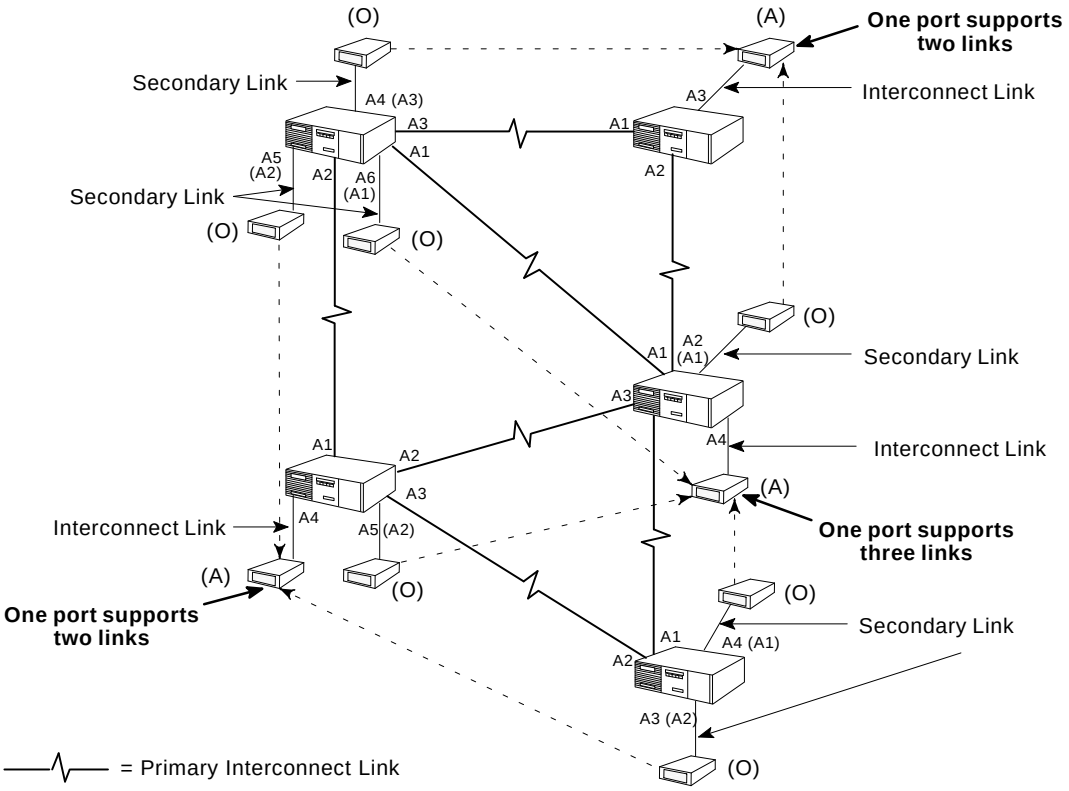


Note: One side of the link must be originate and the other answer. Therefore, a secondary link on one side will always connect to an interconnect link on the other side.

The secondary link may be attached to any of the following devices:

- ISDN Terminal Adapter (TA)
- Modem
- Switched 56 Kbps DSU/CSU

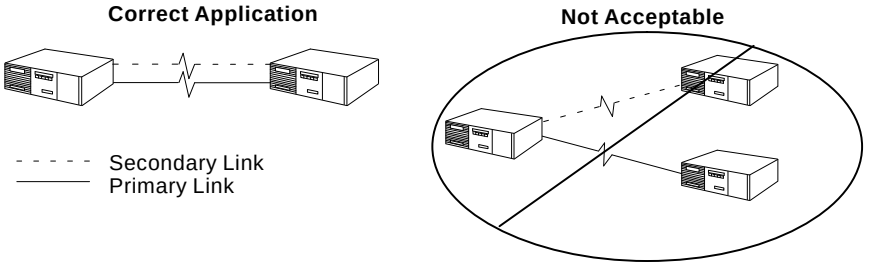
Note: Use equipment which can place a call upon assertion of DTR. The unit will not dial a phone number or pass numbers across to the attached device.



Complex Network

It is important to note the following:

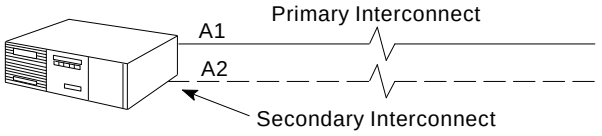
- Originate side is configured as a secondary link and has a single associated primary link.
- Answer side is configured as an interconnect link and may answer for any number of links.
- Before configuring a secondary link, the port designated as the *primary* link must be configured as an interconnect link. A primary link cannot also be assigned as a secondary link.
- The remote end of a secondary link must be the same as the primary link.



- Once the secondary interconnect link is attached (associated) to the primary link, the primary interconnect link's configuration cannot be modified. If you wish to change the configuration of the primary interconnect link, the association between primary and secondary link must be eliminated (refer to Deassigning a Secondary Interconnect Link, page 3-18).
- Each secondary link uses processor power (when activated); this should be considered when planning your network if you will be force connecting a secondary interconnect link.
- A secondary interconnect link **cannot serve as a backup link to a local interconnect link**. If you attempt this connection, the unit will display `NOT SUPPORTED`.
- Configure the secondary link before connecting it to a device. Changing configuration with devices attached could trigger link activation.

Configuring a Secondary Interconnect Link

Using the following example where A1 is to be configured as the *primary* interconnect link and A2 is to be configured as A1's secondary interconnect link, we will go through the procedure of configuring a secondary interconnect.



Configure the primary link (in this case A1 of Node_A) as an interconnect link (refer to page 3-12), and then configure the secondary link (in this case A2 of Node_A) using the following path:

Configure A2 as a Secondary Link

```
COMMAND FACILITY MAIN MENU
  3   CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES
  1   PORT CONFIGURATION
```

```
ENTER NODE-ID/CHANNEL # (^X TO ABORT): NODE_A/A2
```

Option number varies depending on model.

```
PORT CONFIGURATION
      SECONDARY INTERCONNECT LINK
```

Assign A1 as the Primary Link

```
ENTER PRIMARY LINK# NO=DEASSIGN, ^X TO ABORT: A1
```

Return to Main menu

```
CONFIGURE LOCAL NODES
        ENTRY: M
```

Reset Node

```
COMMAND FACILITY MAIN MENU
  10   RESET
```

```
RESET
  1   NODE
```

```
ENTER "Y" TO CONFIRM OR "N" TO ABORT: Y
```

```
PARAMETER RESTORATION
  2   CURRENT CONFIGURATION
```

Deassigning a Secondary Interconnect Link

Follow the procedures for configuring a link. At the following prompt, enter NO.

Deassign secondary link.

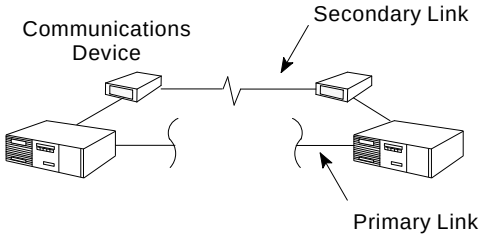
```
ENTER PRIMARY LINK# NO=DEASSIGN, ^X TO ABORT: NO
```

Note: Deassigning the primary link does not delete the secondary interconnect link, you must reconfigure the port to a new type and reset unit.

Mode of Operation

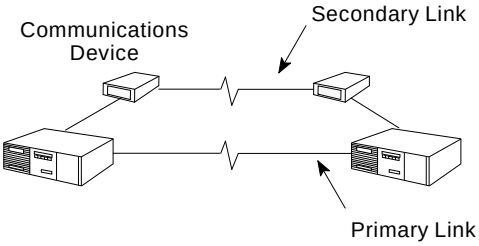
There are two modes of operation for the secondary link:

- *Backup Mode* – In the event of link failure, the secondary link will activate until the primary link returns to service.

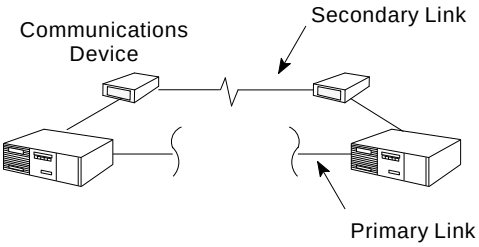


- *Utilization Threshold Mode* – In the event the primary link exceeds a threshold (percentage of utilization) for a period of time, the secondary link will activate and operate until the thresholds established for dropping the secondary link are met (at both ends of the link) for the designated period of time. In this mode, the secondary link will also activate on primary link failure.

Utilization Operation



Backup Operation



Time of Day

All secondary links operate by default for 24 hours a day. If a Time of Day schedule is established for the secondary link, it will only operate during the period of time scheduled as *on* time. If the link is scheduled to be *off*, the link will not operate (unless forced on). For information on Time of Day, refer to page 3-21; for information on Forced On operation, refer to page 3-26.

Backup Mode

The criteria for primary link failure is the following:

CD Loss	2-3 seconds
Sync Loss	10 seconds
Failure to Establish Primary	3 minutes
Poor quality of link:	
all data rates above 19.2 Kbps	1 bad bit to 10,000 good bits
19.2 Kbps and below	1 bad bit to 1,000 good bits

If the Primary Link is down because it is scheduled to be off, the secondary link will not activate.

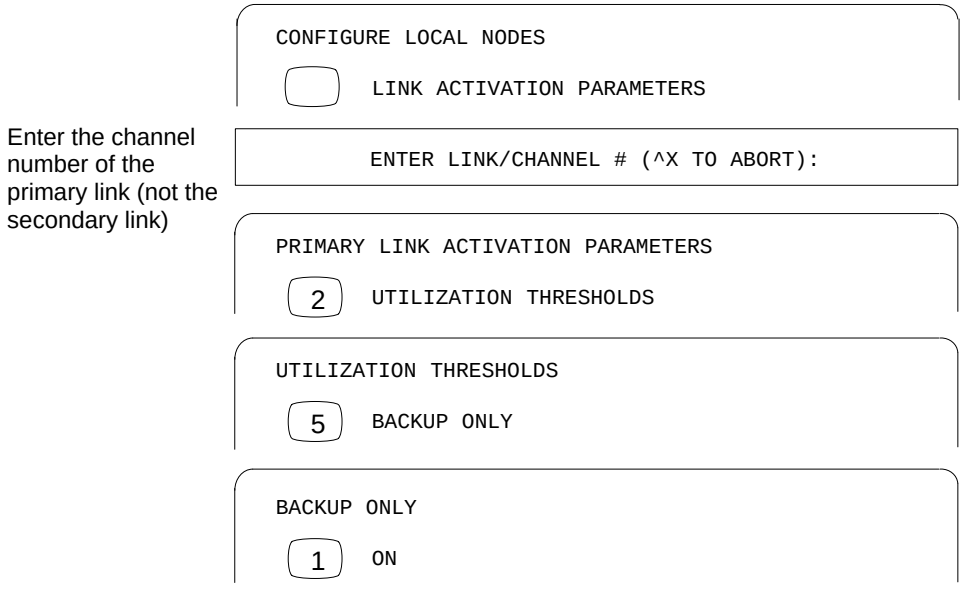
In the event of CD loss or sync loss on the secondary interconnect link, the unit will display `SECONDARY LINK FAILURE`.

The primary link will attempt a connection every ten minutes (00:00, 00:10, 00:20 . . . etc.) by raising DTR. The primary link will be continuously monitored for integrity and will be validated for five consecutive minutes before activating; the indicator for the primary link will be *on* solid during validation (on the side configured as originate). Any sync loss or CD loss will cause the testing timer to reset. When the primary link completes the validation process, it will be restored to service and the secondary link will be placed in backup status.

Should the secondary link fail to activate, it will continue to attempt the connection approximately every three minutes until the primary link activates.

Enabling the backup mode

Configure the port for a secondary interconnect link (refer to page 3-17), and then follow this path:



To disable, follow the same path and select the *off* option.

Utilization Threshold Mode

This mode offers extra bandwidth for those times that primary link traffic is heavy plus the backup mode feature. It functions in the following way:

- Primary link utilization is monitored (at the *originating unit in both directions*).
- Primary interconnect link exceeds the percentage of utilization for a defined period of time in either direction. Example: Port A1 (primary) exceeds 75% utilization for five minutes.
- Secondary interconnect link activates[1].
- Secondary interconnect link and primary link are monitored (on both sides of both links, originate and answer).
- Both links' utilization fall below a percentage of utilization for a defined period of time in both directions. Example: Port A1 (primary) and Port A2 (secondary) combined fall below 50% utilization for five minutes.
- Secondary interconnect link de-activates (drops).
- Primary link utilization is monitored.

Enabling the Utilization Threshold Mode on the Secondary Interconnect Link

Configure the port for a secondary interconnect link (refer to page 3-17), and then follow this path:

```
CONFIGURE LOCAL NODES

   [ ]   LINK ACTIVATION PARAMETERS
```

Enter the channel number of the primary link (not the secondary link)

```
        ENTER LINK CHANNEL # (^X TO ABORT):
```

```
PRIMARY LINK ACTIVATION PARAMETERS

   [2]   UTILIZATION THRESHOLDS
```

```
UTILIZATION THRESHOLDS
    1.  SECONDARY ON THRESHOLD (%)
    2.  ON THRESHOLD TIME LENGTH (min)
    3.  SECONDARY OFF THRESHOLD (%)
    4.  OFF THRESHOLD TIME LENGTH (min)
    5.  SECONDARY LINK BACKUP ONLY          [OFF]
```

[1] If the link cannot activate, it continues attempting a connection approximately every three minutes until the criteria for *Secondary Off Threshold* and *Off Threshold Time Length* is met.

Option	Description
1. Secondary On Threshold (%)	Sets the utilization (in percentages) that the primary link must exceed before the secondary link will activate. The default is 75% (1-99).
2. On Threshold Time Length (min)	Sets the period of time (in minutes) that the primary link must operate above the threshold set in option 1 before the secondary link will activate. The default is 5 minutes (1-99).
3. Secondary Off Threshold (%)	Sets the utilization (in percentages) that the primary and secondary together (in both directions) must *not* exceed before the secondary link will de-activate (drop). The default is 50% (1-99).
4. Off Threshold Time Length (min)	Sets the period of time (in minutes) that the primary and secondary link must remain below the threshold set in option 3 before the secondary link will de-activate (drop). The default is 5 minutes (1-99).
5. Secondary Link Backup Only	For the Utilization Mode, this menu should be set to *off*.

Time of Day

This feature establishes or disables link operation during a certain time of the day. By default, all links are set to be operational 24 hours a day, seven days a week. If you set up a schedule for a link, it will function in the following way:

- *Primary Link* – Turns the link *on* and *off* at the designated times.
- *Secondary Link* – Permits the link to be enabled for its type of operation (backup or primary link utilization) during the scheduled *on* times. Should the primary link fail during the *off* times, the secondary interconnnect link will *not* come up. On the secondary link, the time of day schedule should be set only on the originate side.

Important

If you require the backup or utilization feature to be operational at all times, do not set a schedule for the secondary link. If a schedule was set, refer to page 3-23, cancelling the Time of Day Schedule.

Note: To temporarily override the Time of Day feature on a link scheduled to be off, set the link to Forced On. (Refer to page 3-26, for additional information.)

Setting up the Time of Day Schedule

You may set up the schedule for an Interconnect Link or a Secondary Interconnect Link. This section explains the time of day schedule. It is one element of bandwidth on demand. For specific information on activating a link, refer to the Interconnect Link and Secondary Interconnect Link section which follows.

Time Syntax

- *Times are entered using a 24-hour clock*. That means that 1:00 pm is entered as 13:00 and 5:00 pm is entered as 17:00. Times are referenced to the master clock established for the network (refer to the User's Manual).
- *Times are entered in 10-minute intervals*. These are always 0, 10, 20, 30, 40, and 50 minutes of the hour. For example 1 o'clock a.m. would have the following 10-minute intervals: 1:00, 1:10, 1:20, 1:30, 1:40, 1:50.

Note: It is assumed that you have already set the time, day, and date on your unit. It is recommended that your network include a Real Time Clock; it is not required.

Important

The daily schedule is set at one time. If you wish to add to it or edit it you must set up a whole new schedule. Each time you access the menu, it establishes a new schedule for the day selected.

Option number varies, depending on model.

```
CONFIGURE LOCAL NODE
   [ ]   LINK ACTIVATION PARAMETERS
```

Enter either the primary or secondary link port, depending on which you wish to configure.

```
        ENTER LINK CHANNEL # (^X TO ABORT):
```

```
SECONDARY LINK or PRIMARY LINK ACTIVATION PARAMETERS
   [1]   TIME OF DAY
```

Select the option for your schedule.

```
TIME OF DAY ACTIVATION
    1.  SUNDAY
    2.  WEEKDAYS
    3.  SATURDAY
```

Once you start scheduling, you must complete the schedule for the whole day(s).

```
ACTIVATION SCHEDULE
 1   SET
```

Enter the start time (in 24 hour time).

```
ENTER START TIME (hh:mm, X TO ABORT, 24:00 TO END):
```

Enter the stop time (in 24 hour time).

```
ENTER STOP TIME (hh:mm, X TO ABORT, 24:00 TO END):
```

Continue to enter start and stop times until the schedule for the day is complete. Once this is done, enter 24:00 to complete the process:

- If you enter 24:00 at the Start Time prompt, the link will be *off* for the remaining part of the day.
- If you enter 24:00 at the Stop Time prompt, the link will be *on* for the remaining part of the day.

Example:

For the weekdays, the link is configured to turn on at 7:30 a.m. and turn off at 10:00 a.m., and then turn on again at 8:00 p.m. and remain on until 9:00 p.m., when it will turn off for the remainder of the day.

```
ENTER START TIME (hh:mm, X TO ABORT, 24:00 TO END): 07:30
```

```
ENTER STOP TIME (hh:mm, X TO ABORT, 24:00 TO END): 10:00
```

```
ENTER START TIME (hh:mm, X TO ABORT, 24:00 TO END): 20:00
```

```
ENTER STOP TIME (hh:mm, X TO ABORT, 24:00 TO END): 21:00
```

```
ENTER START TIME (hh:mm, X TO ABORT, 24:00 TO END): 24:00
```

Cancelling the Time of Day Schedule

Follow the same path as you would for establishing a schedule. At the first prompt (`ENTER START TIME`) enter 00:00, at the next prompt (`ENTER STOP TIME`) enter 24:00. The link will remain on all the time thus disabling any previous schedule.

Notes:
- Be sure to do this for all the daily schedules (weekdays, Saturday and Sunday).
- Do not enter 24:00 at the `START TIME`. This will cause the link to be off all the time.

Displaying a Schedule

To display a configured schedule, follow the same pathway as for configuration, select the *Display* option from the Activation Schedule.

```
ACTIVATION SCHEDULE

 2   DISPLAY
```

```
LINK ON          LINK OFF
07:30            10:00
20:00            21:00
```

Interconnect Link

It is assumed that you intend to turn your interconnect link on and off during a 24-hour period of time.

Activating Time of Day Operation on an Interconnect Link

Step		Reference
1	Configure the port for an interconnect link.	Interconnect Link, page 3-10.
2	Set the *Force On* option of the Control Parameters menu to *no*. This must be done so that the link shuts off at the scheduled *off* period of time. *By default it is set to Force On= yes.*	Force On, page 3-26.
3	If the link is going to operate with an associated secondary interconnect link, configure the secondary interconnect link and its operation.	Secondary Interconnect Link, page 3-14.
4	Configure a Time of Day schedule.	Time of Day, page 3-21.

Disabling the Time of Day Operation on an Interconnect Link

Either of these methods will disable the operation. It is recommended that you do both.

	Reference
• Set the *Force On* option of the Control Parameters menu to *yes*. The link will remain on and override the Time of Day schedule.	Force On, page 3-26.
• Configure a new Time of Day schedule for that link, by entering 00:00:00 at the *first* Start Time prompt and 24:00 at the *first* Stop Time prompt.	Time of Day, page 3-21.

Secondary Link

Enabling the Time of Day Operation on a Secondary Interconnect Link

Step		Reference
1	Configure the port for a secondary interconnect link (assign it to a primary link), and configure the type of operation required (either backup mode or utilization mode).	Secondary Interconnect Link, page 3-17.
2	Ensure that the *Forced On* option of the Control Parameters menu is set to *no* (the default for secondary interconnect links).	Disabling Forced-On Operation, page 3-27.
3	Configure the remote port that will be connecting to the secondary link as an interconnect link. Ensure that the *Forced On* option of the Control Parameters menu is set to *yes* (the default for interconnect links).	Force On, page 3-26.
4	Configure a Time of Day schedule for the secondary link.	Time of Day, page 3-21.
5	Connect the link to the external communications devices. You can force on the link to test link operation on the secondary link side. If you do so, be sure to disable the force on feature (Forced On = *no*) on the secondary link side after the testing is complete.	

Disabling the Time of Day Operation on a Secondary Interconnect Link

Procedure	Reference
Configure a new Time of Day schedule for that link, by entering 00:00 at the first Start Time prompt and 24:00 at the first Stop Time prompt. The secondary link will now operate 24 hours a day. The Time of Day feature will be disabled.	Time of Day, page 3-21.

Forced On

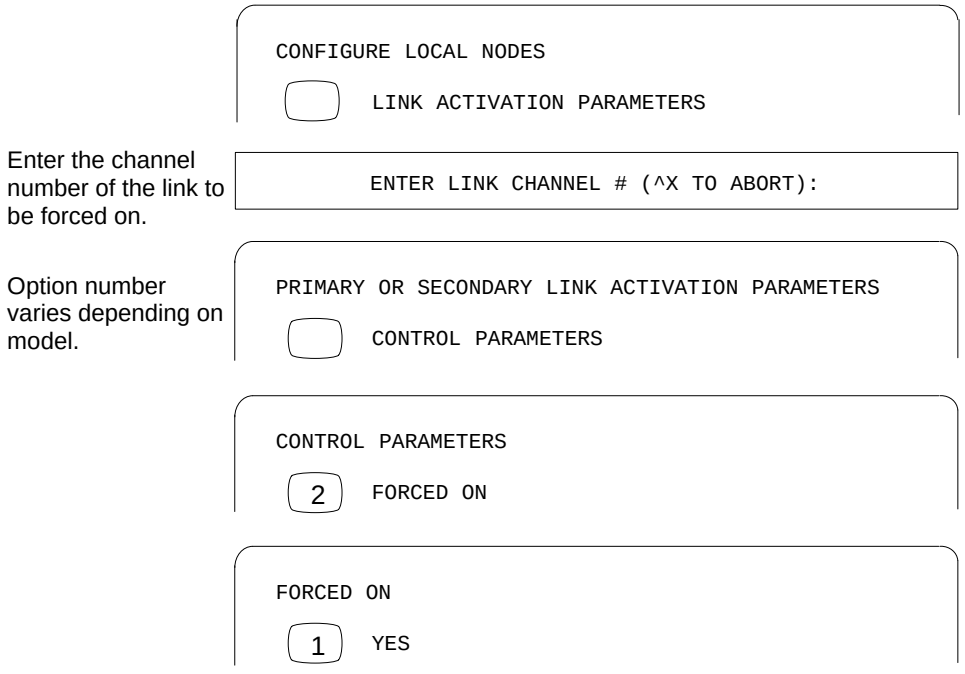
The following links can be forced on:

- All links configured as interconnect links (primary links)
- Secondary interconnect links on Marathon 5K Turbo (A1-A3 only), Marathon 10K and Marathon 20K

This feature will override the backup, utilization and time of day configuration. A link placed in a forced-on state will remain in this state until it is turned *off* (refer to *Disabling forced-on operation*).

- *Interconnect links* – Unless configured to turn on and off via the Time of Day schedule, interconnect links should be forced on (*yes*). This is also true for interconnect links that are serving as the answer side for secondary links.
- *Secondary Links* – The forced on option (*yes*) of the secondary interconnect link is designed for testing purposes. The normal operation is Forced On = *no*. Secondary links on the Marathon 2K, 2K *Plus*, and 3K cannot be forced on.

Forcing on a Link



Disabling Forced-on Operation

Select the *No* option from the Forced On menu.

```
FORCED ON
  2   NO
```

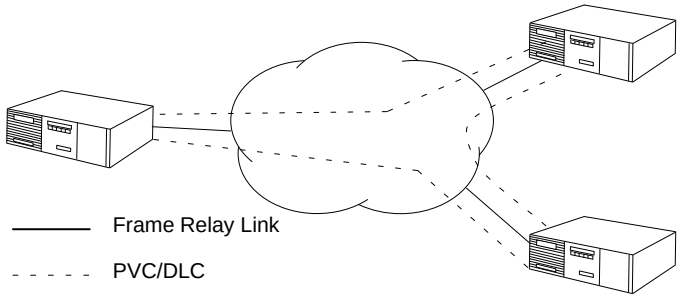
The *no* option does not disable link operation. It places the link in a *not forced-on* state.

Primary Link – The link will turn off upon reaching its next scheduled off time.

Secondary Link –

- Backup Mode: link will de-activate immediately.
- Utilization Threshold Mode: will de-activate when the criteria for *Secondary Off Threshold* and *Off Threshold Time Length* are met.

Frame Relay Link



Public frame relay service offers you the benefits of leased line connectivity to multiple sites. One physical connection into the public frame relay network logically provides the connectivity of a mesh network, although physically the network is a star topology. Applications predominantly use frame relay services for local area networking (LAN) and/or Systems Network Architecture (SNA) internetworking. Other than the multiplexing of permanent virtual circuits (PVCs) over a single physical link, the network operates just like any Integration network.

You can use frame relay, interconnect or local interconnect links simultaneously, building hybrid networks[1].

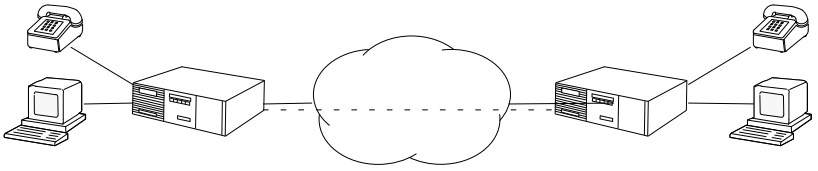
If your network has closed loops (such as the example shown above), be sure to enable mesh (mesh *on*) on the units within the network.

[1] If using hybrid networks, frame relay link should not exceed 512 Kbps.

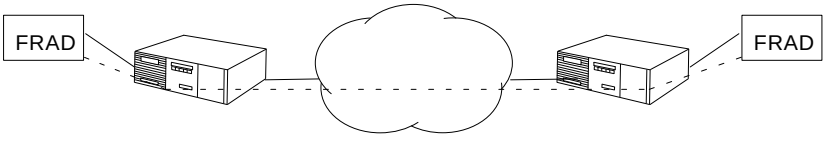
Frame Relay Links and DLCIs			
Unit	**Max # of Frame Relay Access Links**	**Ports which can be Frame Relay Access Links**	**Max # of Configured DLCIs Per Node**
Marathon 2K and 2K *Plus*	**2**	**A1, A2**	**32**
Marathon 3K	**2**	**A1, A2**	**48**
Marathon 5K Turbo	**4**	**A1-A4**	**64**
Marathon 10K	**6**	**A1-A6**	**96**
Marathon 20K	**6**	**A1-A6**	**128**

There are generally two modes of operation for frame relay:

- Virtual Link: Permanent virtual circuit (PVC) connections between Integration units which carry traffic terminated or switched at each node. The DLCI's Level 2 Protocol must be configured for *virtual*.



- Pass-Through PVCs (permanent virtual circuit): A connection involving two or more DLCIs which supports frame relay access devices (FRADs). The DLCI's Level 2 Protocol must be configured for either *Transparent* or *Fragmented*. Refer to Pass-Through Applications for additional information.



Activated Link Maximums		
An *activated link* is a PVC that has been configured on the unit.		
Unit	**Virtual Links (up to a maximum of)**	**Pass-Through PVCs[1] (up to a maximum of)**
Marathon 2K, 2K *Plus*	**12**	**10**
Marathon 3K	**16**	**16**
Marathon 5K Turbo	**20**	**22**
Marathon 10K	**24**	**36**
Marathon 20K	**36**	**46**

[1] In this application, there are two DLCIs for each PVC. These may be increased if the number of virtual links is decreased.

Note: The maximums given are for a frame relay only application. In a hybrid network (frame relay and interconnect links) the numbers may vary. Contact your MICOM Certified Distributor for additional information.

Utilized Link Maximums

A *utilized link* is defined as a link actually transmitting and receiving data between nodes at a given instant in time.

Unit	Virtual Links (up to a maximum of)	Pass-Through PVCs (up to a maximum of)	Total per Node[1]
Marathon 2K, 2K *Plus*	**8**	**8**	**12**
Marathon 3K	**10**	**10**	**16**
Marathon 5K Turbo	**12**	**12**	**20**
Marathon 10K	**16**[2]	**12**	**24**
Marathon 20K	**20**[2]	**20**	**32**

[1] Application dependent.
[2] Without mesh enabled; with mesh enabled the maximum is 12.

Maximum Link Speeds (on a Frame Relay only unit)

Unit	The maximum bandwidth combination (in Kbps) for the following ports:					
	A1	**A2**	**A3**	**A4**	**A5**	**A6**
Marathon 2K, 2K *Plus*	**384**	**256**	**n/a**	**na/**	**n/a**	**n/a**
Marathon 3K	**384**	**256**	**n/a**	**na/**	**n/a**	**n/a**
Marathon 5K Turbo	**512**	**512**	**–**	**–**	**n/a**	**na/**
	256	**256**	**256**	**256**	**n/a**	**na/**
Marathon 10K Marathon 20K	**512**	**512**	**–**	**–**	**–**	**–**
	512	**256**	**256**	**–**	**–**	**–**
	256	**256**	**256**	**256**	**–**	**–**
	256	**256**	**128**	**128**	**128**	**128**

General Recommendations:

- Sync support: The number of sync channels supported over the frame relay access link depends on the link's rate and the CIR implementation of the frame relay switching equipment and network congestion characteristics.
  - It is recommended that you use the SNAPS option for SNA traffic in order to reduce delay and network traffic.
  - TDM sync channels are not supported.
  - It is recommended that sync speeds be 19.2 Kbps or higher. If you are using a slower speed, the block size should be *short*.
- Voice/Fax support: The number of voice/fax channels supported over the frame relay access link depends on the link's rate and the CIR implementation of the frame relay switching equipment and network congestion characteristics. (Generally this is 80% of the CIR.)
  - Voice channels configured for continuous bandwidth are not supported.
- It is recommended that you do not connect two frame relay networks over a leased line backbone.
- If using frame relay links in a mesh environment (closed loop), be sure to enable mesh (Mesh Router = *On* in the Node ID Configuration Menu.)
- With mesh enabled, the maximum number of utilized virtual links is twelve. In hybrid networks, reduce the number of utilized virtual links by one for each configured interconnect link.

Configuration

Prior to configuration, obtain the following information from the carrier provider:

- DLCI numbers (there will be two DLCI numbers for each DLC, one for each end point)
- DLCI parameters (Be, and CIR)
- Local management protocol: Annex D, LMI Rev. 1 or None
- Local management parameters (if Annex D or LMI Rev. 1 Protocol)

Prior to connecting to the frame relay network, you must configure the DLCI (add DLCI) and verify that port clocking (if other than external) is correctly set. This configuration can only be accomplished at the local unit (it can not be done remotely). Once this is complete, the frame relay link can be attached and the DLCI connected. The process is as follows:

1. Configure port for frame relay (refer to Port Configuration, page 3-8) and reset the node to *current configuration*.
2. Configure the frame relay link parameters (see Frame Relay Link Parameters, page 3-32)
3. Reset the frame relay link (reset access link option) to set the frame relay link parameter configuration changes (refer to page 3-34).
4. Configure the DLCI (refer to DLCI Configuration, page 3-34).
5. Reset the DLCI to set the DLCI parameter changes (page 3-38).
6. Connect the frame relay link.

Frame Relay Parameters

Follow this menu path to configure the parameters:

Note: Before proceeding, the port must have previously been configured as frame relay (Port Configuration menu) and the node reset to current configuration.

Option number varies depending on model

```
CONFIGURE LOCAL NODES

( )  FRAME RELAY PARAMETERS
```

```
ENTER NODE ID/CHANNEL # (^X TO ABORT): NODE_A/A1
```

```
FRAME RELAY PARAMETERS

    1.  FRAME RELAY LINK PARAMETERS
    2.  LOCAL MANAGEMENT PROTOCOL PARAMETERS
    3.  DLCI CONFIGURATION
```

Option	Description
1. Frame Relay Link Parameters	Sets the clocking, speed, frame size, address, and local management protocol for the access link. Refer to Frame Relay Link Parameters for additional information.
2. Local Management Protocol Parameters	Configures the local management protocol parameters.
3. DLCI Configuration	Adds, deletes, lists and modifies the parameters of a DLCI. Refer to DLCI Configuration, page 3-34.

Frame Relay Link Parameters

```
FRAME RELAY PARAMETERS

 1   FRAME RELAY LINK PARAMETERS
```

```
ENTER NODE ID/CHANNEL # (^X TO ABORT): NODE_A/A1
```

```
FRAME RELAY LINK PARAMETERS

    1. CLOCK SPEED
    2. PORT CLOCKING
    3. MAXIMUM FRAME SIZE
    4. NETWORK ADDRESS
    5. LOCAL MANAGEMENT PROTOCOL
```

Option	Description
1. Clock Speed	Sets the clock rate. If externally clocked (Port Clocking option), no configuration is required.
2. Port Clocking	Sets the link's source for a receive and transmit clock. **Note:** If you configure internal clocking, set the rate desired (Clock Speed option).
3. Maximum Frame Size	Sets the maximum frame size (in octets) including header and user information. It does not include the frame check sequence. Default = 4096. Range = 5-8189
4. Network Address	Address of the frame relay channel (assigned by the carrier provider based on a standardized numbering scheme). Up to 16 characters.
5. Local Management Protocol	Sets the protocol required by the carrier provider. If you select Annex D or LMI Rev 1 protocol, be sure to configure those parameters. (*Local Management Protocol Parameters* option of Frame Relay Parameters menu).

Local Management Protocol Parameters

If you select either Annex D or LMI Rev. 1 local management protocol, you may set the management parameters using the following path:

```
FRAME RELAY PARAMETERS

 2   LOCAL MANAGEMENT PROTOCOL
```

```
LOCAL MANAGEMENT PROTOCOL PARAMETERS

    1.  FULL STATUS POLLING COUNTER
    2.  ERROR THRESHOLD
    3.  MONITORED EVENTS COUNT
    4.  LINK INTEGRITY VERIFICATION TIMER
    5.  POLLING VERIFICATION TIMER
    6.  ACCESS LINK MODE
```

Option	Default	Description
1. Full Status Polling Counter	6	The frequency that a full status reports are made relative to the status inquiry polls (1-255).
2. Error Threshold	3	The number of errors that need to occur in the last monitored events (next option) before the link is considered down (1-10).
3. Monitored Events Count	4	The number of consecutive events that are monitored to determine the link status (1-10).
4. Link Integrity Verification Timer	10	The number of seconds after which the unit will send a status inquiry to the frame relay network (5-30 seconds).
5. Polling Verification Timer	15	If the network does not receive a valid status inquiry within the time configured (in seconds), it reports an error (5-30 seconds).
6. Access Link Mode	User	Selects whether the user or the network will generate statistics for the access link. (Network = Links connected to frame relay access devices (FRADs); User = other applications)

Frame Relay Link Reset

To set the newly configured parameters, you must reset the access link as shown.

```
COMMAND FACILITY MAIN MENU
  10   RESET
```

```
RESET
  2    LINK
```

```
        ENTER LINK CHANNEL # (^X TO ABORT):  A1
```

If the port is configured as a frame relay link, the Frame Relay Link Reset menu will display.

```
FRAME RELAY LINK RESET
  1    RESET ACCESS LINK
```

DLCI Configuration

Accessed from the Frame Relay Parameters menu, this menu offers the following options:

```
FRAME RELAY PARAMETERS
  3    DLCI CONFIGURATION
```

```
DLCI CONFIGURATION
    1.  ADD DLCI
    2.  DELETE DLCI
    3.  DLCI PARAMETERS
    4.  LIST DLCI
```

Option	Description
1. Add DLCI	Specifies a DLCI for the frame relay link and sets the Level 2 Protocol. Refer to Level 2 Protocol below.
2. Delete DLCI	Deletes a DLCI from a frame relay link.
3. DLCI Parameters	Sets the parameters for a specific DLCI. The information for these menu options comes from the carrier provider.
4. List DLCI	Lists the known DLCIs on the link. The status of each DLCI is given. **Note:** To list the DLCIs, refer to page 3-38.

Level 2 Protocol

This menu displays when you add a DLCI to your unit:

```
LEVEL 2 PROTOCOL
    1.  TRANSPARENT
    2.  VIRTUAL LINK
    3.  FRAGMENTATION
```

Option	Description
1. Transparent	For links connecting directly to frame relay access devices (FRADs). (Refer to Pass-Through Applications, page 3-36.)
2. Virtual Link	For links connecting to other Integration units.
3. Fragmentation	For links connecting to other Integration units. This is for a DLCI which will be connected to another DLCI (within the unit) with frame relay access devices (FRADs) attached. This option reduces the frame size across the link, thus reducing delays and maintaining voice quality. (Refer to Pass-Through Applications, page 3-36.) **Note** With Fragmentation, you cannot configure the frame size. The unit will fragment automatically.

Note: After configuration, you may not change a Level 2 Protocol. In order to do so, delete the DLCI and then add it; then set the new protocol.

Frame Relay Parameters

Once you have configured a DLCI you will need to configure the DLCI parameters:

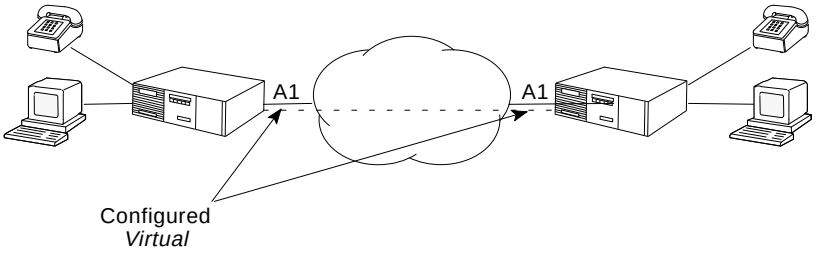
```
FRAME RELAY PARAMETERS

 3   DLCI PARAMETERS
```

```
DLCI PARAMETERS
    1.  COMMITTED BURST SIZE FORWARD (BC.FWD)
    2.  COMMITTED BURST SIZE BACKWARD (BC.BWD)
    3.  EXCESS BURST SIZE FORWARD (BE.FWD)
    4.  EXCESS BURST SIZE BACKWARD (BE.BWD)
    5.  CIR FORWARD (CIR.FWD) (BPS)
    6.  BACKWARD (CIR.BWD) (BPS)
```

- Committed burst size: (Bc) The maximum amount of data, in bits, that a network agrees to transfer under normal conditions. Data may or may not be contiguous.
- Excess burst size: (Be) The maximum amount of uncommitted data, in bits, that the network will attempt to deliver. Data may or may not be contiguous.
- CIR, Committed Information Rate: Similar to data rate, the predictable level of service for the DLCI. If you are using voice in your network, do not select a rate lower that 16 Kbps unless you are using zero CIR).

Virtual Links

Virtual links are permanent virtual connections (PVCs) between Integration units which carry traffic terminated or switched at each node.

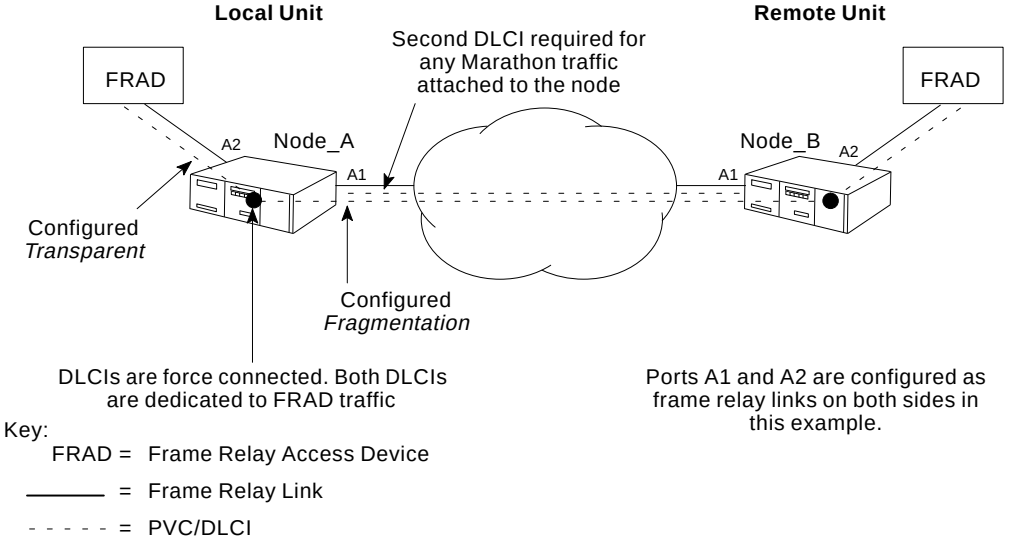


Note: No FRADs attached

Pass-Through Applications: Attaching Frame Relay Access Devices (FRADs)

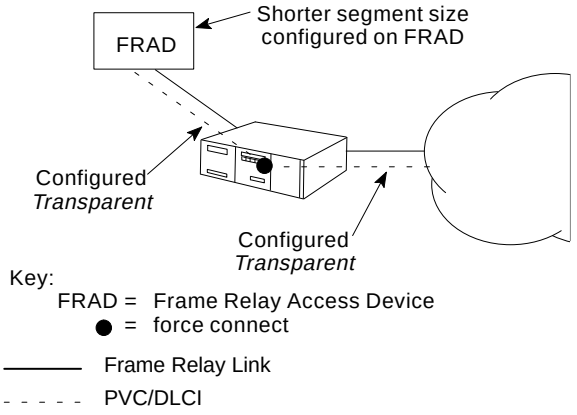
Configure the unit as shown in the diagrams for the optimum performance.

Connecting FRADs through Integration units

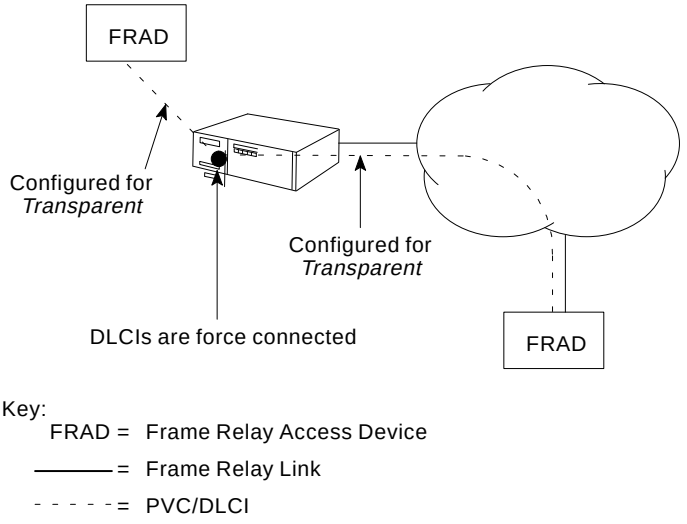


- The DLCI with a FRAD should be force connected to the network side DLCI (in the example this is Node_A/A2.xxxx to Node_A/A1.xxxx, where xxxx = DLCI). Refer to page 5-3 for information on force connection. Once force connected, all the DLCIs in the path are considered a single permanent virtual circuit (PVC).

- Rather than using a DLCI configured for *fragmentation* on the network side of a pass-through application, you may select a *transparent* configuration. In this case, the attached device (FRAD) needs to be configured to a shorter segment size thus reducing voice delays across the network A good general rule is to use one octet per kilobit of channel speed. So for 256 Kbps channel rate, a segment size of 256 octets is suggested. The maximum channel frame size is 2048 octets.



Connecting a FRAD through an Integration unit to another FRAD directly connected to the frame relay network



Resetting the DLCI

To set the newly configured parameters, you must reset the DLCI as shown.

```
COMMAND FACILITY MAIN MENU
 10   RESET
```

```
RESET
 2    LINK
```

```
ENTER LINK CHANNEL # (^X TO ABORT):  A1
```

Only if the port is configured as a frame relay link, the Frame Relay Link Reset menu will display.

```
FRAME RELAY LINK RESET
 2    RESET A SPECIFIC DLCI
```

```
ENTER DLCI TO RESET (^X TO ABORT):
```

List DLCI

For the frame relay link, you may wish to view a list of the DLCIs and their state (configured, reported, and active). Follow this path:

```
CONFIGURE LOCAL NODES
      FRAME RELAY LINK PARAMETERS
```

```
ENTER NODE-ID/CHANNEL # (^X TO ABORT):
```

```
FRAME RELAY PARAMETERS
 3    DLCI CONFIGURATION
```

```
DLCI CONFIGURATION
 4    LIST DLCI
```

```
101-VRA 103-V 114-R 115-VR 222-FRA 223-FRA
325-UR 727-TRA

8 DLCI'S ON FRAME RELAY LINK A01
```

V = DLCI configured as virtual link
F = DLCI configured for fragmentation
T = DLCI configured for transparent protocol
R = DLCI reported
A = DLCI active
U = DLCI unassigned

MICOM Muxes (all units except Marathon 3K)

MICOM muxes include the LCi/Val-U-Mux as well as the older Enhanced Statistical Multiplexers (ESM), Enhanced Statistical Synchronous Multiplexers (ESS), Fast Statistical Multiplexers (FSS or FSM), Fast Statistical Data/Voice (FSV). See Table 3-2 for a complete list. The Marathon 2K supports one mux on port A1; the Marathon 3K does not support mux links. With the exception of the Marathon 2K and 3K, each unit can support up to five MICOM muxes on links (A1-A5) with speeds up to 19.2 Kbps full-duplex. MICOM muxes support only async data channels. The MB2-FSV supports both data and voice/fax channels (mux link only). **A MICOM mux must be reset after the link is connected to initialize it to work with a Marathon unit.**

MICOM muxes may be connected via mux links or X.21 links. Be sure to renumber and rename the MICOM mux node after configuration (refer to page 3-47).

The period report (also Last Period Report and Demand Report) can offer statistics on actual link usage. The unit will show both the local and remote statistics. Since the unit does not transfer information to the mux, the mux will show only its local statistics. See Section 6, Administration, for additional information.

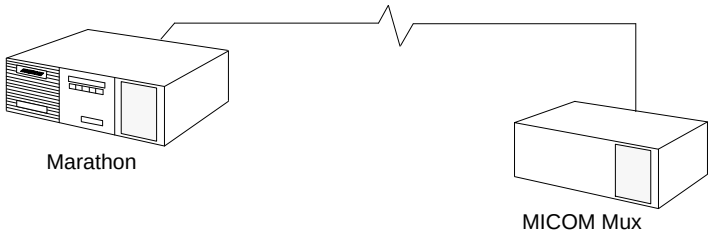
Table 3-2. MICOM Mux Compatibility

Mux	FEATUREPAK Cartridge	Prom No. and Revision
MB2	ESM	907-1911-0F or higher
	FSM	907-2102-0A or higher
	FSV	907-2120-0B or higher
		907-2157-0A or higher
MB3	ESS	907-2002-0G or higher
	FSS	907-2103-0C or higher
MB5	ESM	907-1992-0B or higher
	ESS	907-1993-0D or higher
	FSS	907-2105-0B or higher
LCi/Val-U-Mux[1]	n/a	907-2013-0A or higher

[1] Will not support X.21 bis application.

Mux Links

The mux link supplies the correct protocol to connect a MICOM mux to an Integration unit over a leased line.



In the example shown below, A4 of Node_A is to be configured as a mux link. The steps include configuring the port, setting the clocking and resetting the node.

Access Port Configuration menu

```
COMMAND FACILITY MAIN MENU
  3    CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES
  1    PORT CONFIGURATION
```

```
ENTER NODE-ID/CHANNEL # (^X TO ABORT): NODE_A/A4
```

Configure Mux Link

```
PORT CONFIGURATION
       MUX LINK
```

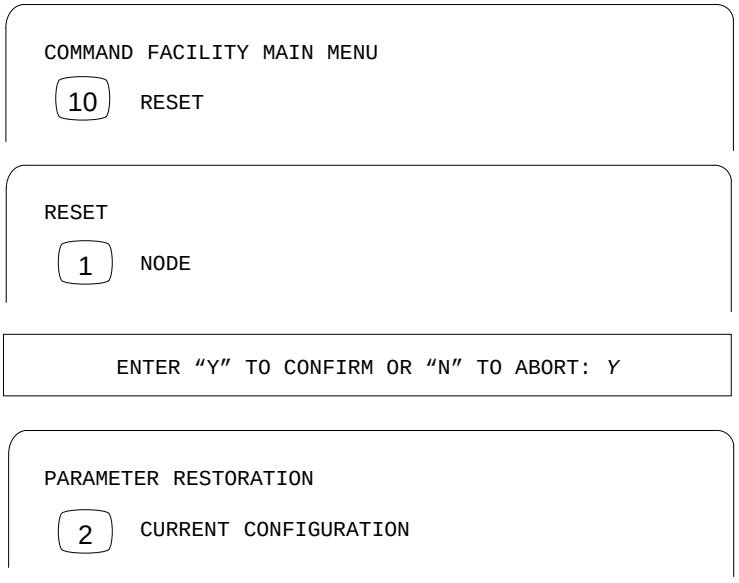
Set Clocking (see Clocking Option below)

```
SET LINK RATE
  1    SYNC EXTERNAL CLOCKS
```

Return to Main menu

```
CONFIGURE LOCAL NODES
       ENTRY: M
```

Reset Node



Mux Link Clocking Options

When the Mux Link option is selected from the Port Configuration menu the Set Link Rate menu displays with the following clocking options:

1. Sync External Clocks — Connect via modem. Most common application
2. 2400 Sync Internal Clocks
3. 4800 Sync Internal Clocks
4. 9600 Sync Internal Clocks
5. 12000 Sync Internal Clocks
6. 14400 Sync Internal Clocks
7. 16800 Sync Internal Clocks
8. 19200 Sync Internal Clocks

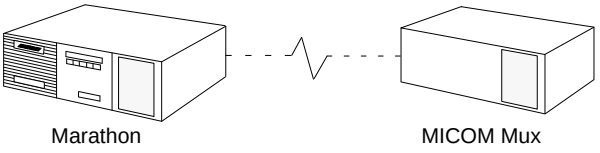
   Connection is back-to-back (no communications device) or for providing clocking to a device. Used when units within a close proximity.
9. 9600 Async
10. 1800 Async
11. 1200 Async

    Connection via async modem (voice/fax not supported).

Assuming that you have installed and configured the communications device for the mux link (i.e., modem), connect the cable. The integrity of the mux link is verified by observing that the CCM indicator light goes off for the port(s) being used.

X.21 Links

The X.21 link connects a MICOM mux to an Integration unit (all units except the Marathon 3K) over an X.21 link.



Unlike the mux links (leased line links) which are permanently connected, X.21 is a *pay as you go* link. When a signal is raised, the X.21 bis network automatically establishes the link to the remote side. When you are finished, the link is dropped until it is again needed. The link is established *on demand*. X.21 is for data only channels; X.21 does not support voice/fax channels. In X.21 link operation, the unit *must* be connected (via PTT-provided line terminator) to a MICOM mux (not another Marathon).

This X.21 application (X.21 bis) is designed for Automatic Direct Call across an X.21 network. *Automatic Direct Call* means that any data or signal (DTR) activity on any Integration channel configured for X.21 applications causes the unit to signal the X.21 network to initiate a call. Only one call route is required. Calls initiated locally and remotely (at the mux end) have the capacity to switch and contend for resources on the Marathon. When you select X.21 link operation at the port configuration menu, a clocking message will not display; X.21 clocking is provided externally.

In the example shown below, A5 of Node_A is to be configured as an X.21 link. The steps include configuring the port and resetting the node.

Access Port Configuration menu

```
COMMAND FACILITY MAIN MENU
 3   CONFIGURE LOCAL NODES
```

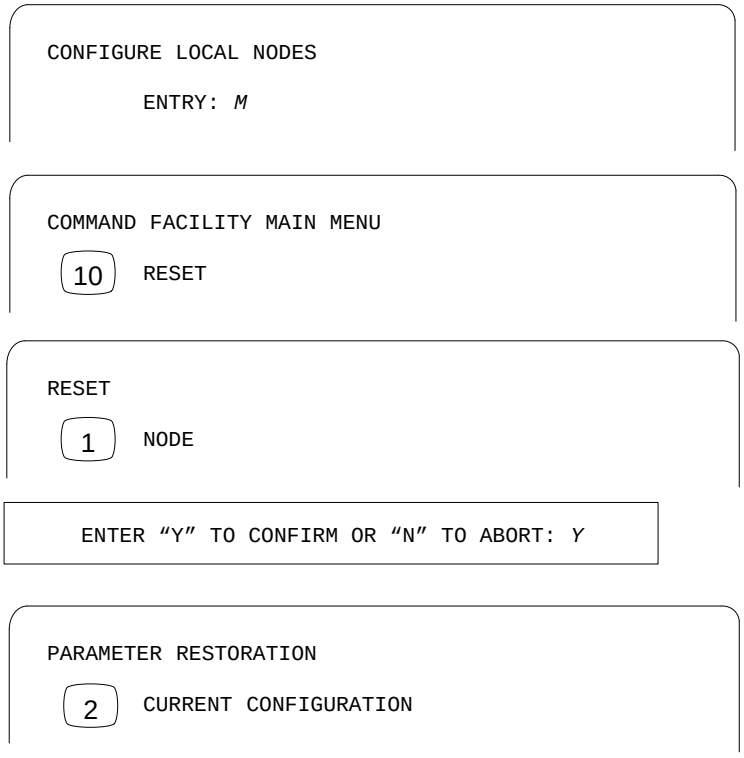
```
CONFIGURE LOCAL NODES
 1   PORT CONFIGURATION
```

```
ENTER NODE-ID/CHANNEL # (^X TO ABORT): NODE_A/A5
```

Configure X.21 Link

```
PORT CONFIGURATION
     X.21 LINK
```

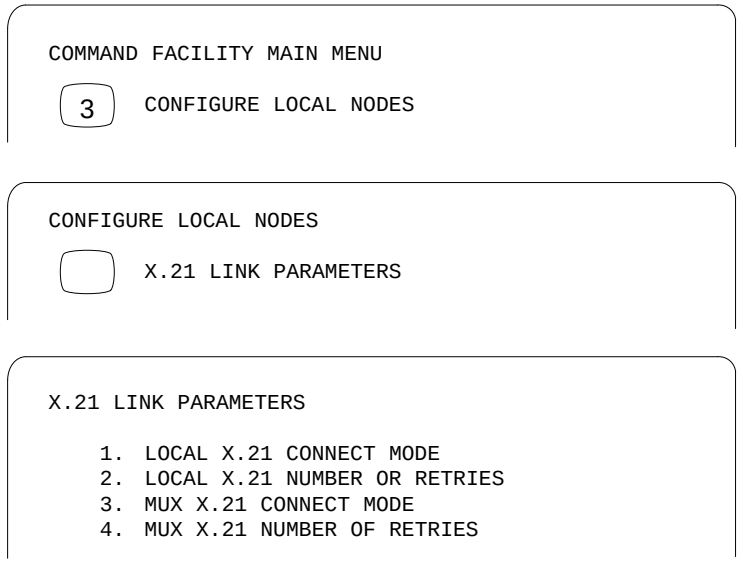
Reset Node



Be sure to configure the X.21 Link Parameters.

X.21 Link Parameters

To set the X.21 Link Parameters, follow this path of selections through the menus:


COMMAND FACILITY MAIN MENU
3 CONFIGURE LOCAL NODES
CONFIGURE LOCAL NODES
X.21 LINK PARAMETERS
X.21 LINK PARAMETERS
1. LOCAL X.21 CONNECT MODE
2. LOCAL X.21 NUMBER OR RETRIES
3. MUX X.21 CONNECT MODE
4. MUX X.21 NUMBER OF RETRIES

If the port is not configured as X.21, you will receive a `NOT IN X.21 MODE` error message.

X.21 Parameter descriptions are as follows:

Option	Default	Description
1. Local X.21 Connect Mode	Data Activity Connect	Data Activity is currently the only option on this menu (refer to Data Activity).
2. Local X.21 Number of Retries Mode	20	The number of attempts (1-63) the unit will make to place a call.
3. Mux X.21 Connect	Data Activity Connect	Configures the connect mode on the mux side of the X.21 link (either Data Activity Connect or DTR) (refer to Data Activity).
4. Mux X.21 Number of Retries	20	The number of attempts (1-63) the MICOM mux will make to place a call.

A link reset (option 2 of the Reset menu) is required once all X.21 parameters are configured. After resetting, the unit will exchange information with the MICOM mux and approximately 20 seconds later, the link will drop until an X.21 call is initiated. The Command Facility Node Status display will show the link status. The indicator lights do not reflect the link status.

Data Activity Connect

Data Activity Connect is the only available option for Integration unit ports using X.21 protocol. For MICOM mux ports, there is another option (DTR). When you select Data Activity Connect, you will be asked to set (in seconds) the data activity timeout period.

```
ENTER X.21 NUMBER OF SECONDS: [5]
```

When the X.21 link is in use and the unit does not detect data activity within the specified time, it will *time out* and drop the connection. The link will remain in readiness for a call until the next call request.

Initiating and Disconnecting an X.21 Call

To originate an X.21 call

Data Activity Configured: (Integration unit or MICOM Mux)	Data activity is detected (and buffered in the calling unit until synchronization is established with the remote unit – either mux or Integration unit)
DTR Configured: (MICOM Mux)	DTR is transitioned (*low* to *high*)

When the above occurs, the composite X.21 network raises the DTR signal to the local line terminator. Once the call is established, the unit and the attached mux will synchronize and data transmission will commence. (Should the unit be unable to synchronize with the MICOM mux, a `LINK DOWN` message is output and the port originating the call will display a `DATA LOST` message.)

To disconnect an X.21 call: The connection is broken under the following conditions:

Data Activity Configured:	No data activity for a time greater than configured on the *No Data Activity Timer* (times out) (refer to page 3-44).
Class and Matrix Connections:	Three **<breaks>** within six seconds
DTR Configured:	DTR transitions from *high* to *low*.

X.21 Channels

There is no special async channel configuration required with the possible following exception. A special configuration is required if you are trying to connect a port on the Integration unit (which requires a DTR protocol) to a port on a MICOM mux (configured for DTR). Even though the Marathon X.21 link is set for Data Activity, the Integration unit's port, if configured for *DTR* at the Connect Protocol menu, will function as needed. Note that the port only disconnects if the user terminates a call; if the user walks away from the terminal while it is in use, DTR stays *high* and the link remains active. To overcome this situation, you should create a special class for this port(s) and set a no activity timeout for it. The following procedure shows you how to do this. (The text in *italics* show examples of responses to the prompt.)

1. Create a class for the DTR channel (i.e., DTR).

```
CONFIGURE LOCAL NODES
  [ ]   CLASS PARAMETERS
```

You can select 1-64

```
ENTER CLASS NUMBER (^X TO ABORT): 1
```

Any name up to 8 characters

```
ENTER CLASS NAME [  ] (^X TO ABORT): DTR
```

```
CLASS PARAMETERS
  [5]   CLASS NO ACTIVITY TIMEOUT
```

You can select 0-60 minutes

```
ENTER CLASS NO ACTIVITY TIMEOUT [0]: 5
```

To continue to next step, enter P for previous.

```
CLASS PARAMETERS

ENTRY: P
```

2. Configure the port for *DTR* and assign it to the class (DTR).

```
CONFIGURE LOCAL NODES
  2   ASYNC CHANNEL
```

```
ENTER NODE–ID/CHANNEL # (^X TO ABORT): NODE_A/B2
```

```
ASYNC CHANNEL
  4   SWITCHING PARAMETERS
```

```
ASYNC CHANNEL SWITCHING PARAMETERS
  1   CONNECT PROTOCOL
```

```
CONNECT PROTOCOL
  2   DTR
```

```
CONNECT PROTOCOL
  7   RESOURCE CLASS
```

```
ENTER RESOURCE CLASS (8 CHARS MAX) (^X TO ABORT): DTR
```

For additional information on configuring your async port parameters refer to page 4-16, and for classes, refer to page 5-7.

You may wish to view the async channel configuration (switching parameters) to verify that the channel has been attached to the class (refer to page 6-12).

MICOM Mux Node IDs

Note: Once the X.21 and mux link have been configured, you may connect the cables. Refer to the Installation and Cabling Manual for specifics.

Mux and X.21 links have default numbers and names according to the port they are assigned (see Table 3-3). Renumber and rename after links have been configured.

If there is a problem ascertaining the mux node ID, you may display the node status which will show the node names for local MICOM muxes. To do this select option 2, Status/Statistics, from the Command Facility Main Menu. At the Status/Statistics menu, select option 1, Node Status. The Node Status display will list the node ID and node number of all local MICOM muxes. (To view the remote MICOM muxes attached to a remote Integration unit, access the remote Command Facility Main Menu and repeat the process.)

Table 3-3. MICOM Mux Defaults

Mux Connected to Port	Default Node Number[1]	Default Node ID[1]
A1	241	!241
A2	242	!242
A3	243	!243
A4	244	!244
A5	245	!245

[1] If you have the NMS module, the defaults may be different. Refer to the NMS Manual.

To rename the MICOM muxes (node), select the Node IDs option from the Configure Local Nodes menu and proceed with the following:

```
NODE-ID CONFIGURATION
  2   MUX/X.21 LINK NODE(S)
```

Enter the module location A, and the port number (1, 2, 3, 4 or 5).

```
ENTER LINK CHANNEL NO: A4
```

Enter your node ID number.

```
ENTER NODE-ID # [current value] (^X TO ABORT): 102
```

Enter your node ID (name).

```
ENTER NODE–ID (^X TO ABORT) (^X TO ABORT): NODE_C
```

To continue configuring, press C at the following prompt. Otherwise, press Y.

```
**SELECT "Y" TO RESET SYSTEM WHEN NODE CHANGES MADE**
ENTER "Y" TO RESET "C" TO CONTINUE: Y
```

You may press **Y** which will force the reset and complete the node configuration process or you may press **C** which will return you to the Node ID Configuration menu. If you select **C**, your configuration will be placed into *temporary storage* so that you can continue to configure additional node IDs. When all the node IDs have been configured, accept the reset by pressing **Y**.

⚠ CAUTION

Should you configure a node ID, press **C** and then exit the Node ID menu your new configuration will be lost. The old node ID(s) will remain intact.

Remote Configuration

Remote configuration is altering or setting any parameter on any unit other than the local unit. This includes locally-connected MICOM muxes as well as remotely connected MICOM muxes. Once the interconnect, mux and X.21 links are operational, this process can occur.

Remote Marathon Configuration

The local unit can configure the remote unit in the same manner as the local unit is configured. You should connect one interconnect link and reconfigure the remote unit associated with that link. If there are MICOM muxes connected to the remote unit, those should be renumbered and renamed.

Once this is complete, connect the next interconnect link and configure that remote unit (and its MICOM muxes) and so forth until all the remote units (and their MICOM Muxes) are configured.

Note: Refer to the Installation and Cabling Manual for connection and cabling information.

You can reconfigure the sync, async, voice/fax and LAN modules using the same access procedure. See Section 4 and 5 for async and sync port configuration information. It is not recommended that you configure integral modems remotely.

To begin remote configuration, follow these steps:

1. Renumber and rename the local unit and all local MICOM muxes (and reset the unit at the Node IDs menu).
2. If not already connected, connect the interconnect link. The remote unit will carry the same default node number and ID as the local unit (see Figure 3-1).

Note: If you connect the link before renaming the local node, the following message will appear:

```
!240 DUPLICATE NODE ID #[channel number]1
```

[1] This message will not appear if the node with the duplicate ID is connected to a remote unit rather than directly to the local unit.

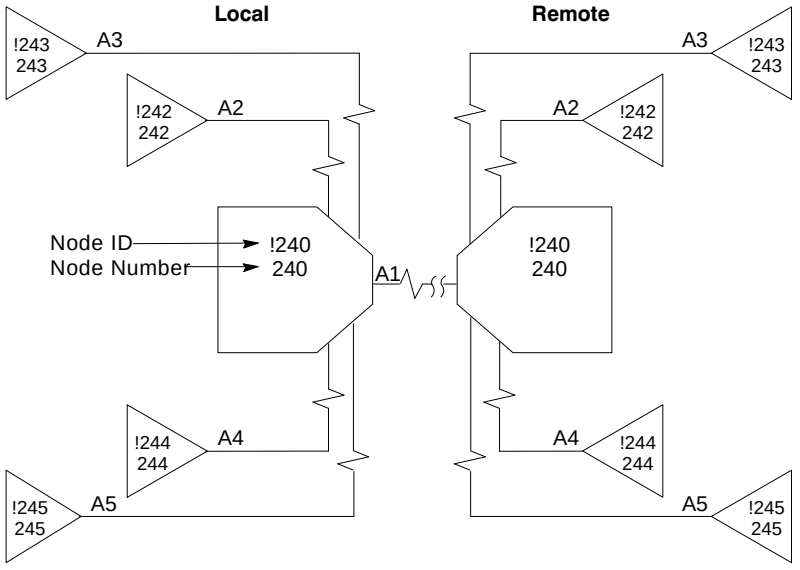


Figure 3-1. Default Node IDs and Numbers in a Typical Network

3. Select the Configure/View Remote Node option from the Command Facility Main Menu.

```
COMMAND FACILITY MAIN MENU

 4   CONFIGURE/VIEW REMOTE NODE
```

```
ENTER REMOTE NODE ID (^X TO ABORT): !240
```

4. Enter !240 followed by Enter to accept the entry. The remote Command Facility will prompt you for the remote password. Enter the password followed by Enter; the remote Command Facility Main Menu will display. It will look exactly the same except that the node ID of the remote node will be displayed at the top of the screen. This is the only difference between the remote and local Command Facility Main Menu.
5. Rename the remote Integration unit by selecting the Node IDs option from the Configure Local Nodes menu. (This procedure is detailed on page 2-9). Remember that this invokes a node reset. You will be returned to the local Command Facility. To return to the remote Command Facility, repeat steps 3 and 4 using the newly configured node ID (rather than !240).

6. Rename and number any remote MICOM muxes. Figure 3-2 shows the same network as Figure 3-1 after it has been renamed and renumbered.

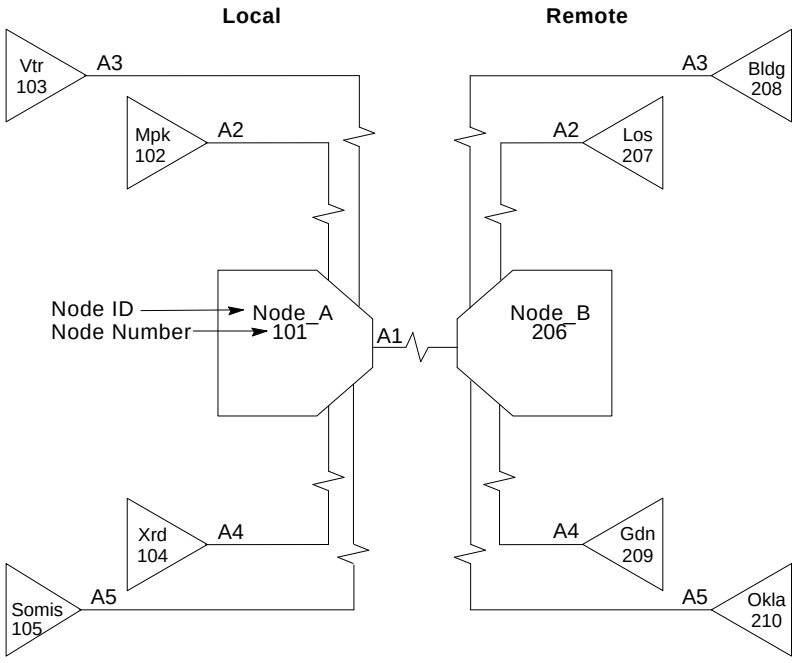


Figure 3-2. Example of an Integration Network After it Has Been Renumbered and Renamed

Once this process is complete, you may configure the remote ports as desired. You may also configure any remote MICOM muxes. When finished, exit the remote Command Facility by selecting the Exit option of the remote Command Facility Main Menu. This will return you to the local Command Facility Main Menu.

MICOM Mux Configuration from the Integration Unit

The data and voice/fax ports of the MICOM mux(es) can be configured from the local unit. This includes MICOM muxes attached to the local and remote unit. The MICOM mux(es) should already have a new number and ID (refer to page 3-47).

To configure a data or voice port, enter the Command Facility that is *local to the MICOM mux* (the one to which the MICOM mux is directly attached) and select the Configure Local Nodes option from the Command Facility Main Menu. Select the parameter for configuration and proceed with configuration of the port as if it were an Integration unit.

You may also use the copy channel parameters to copy an existing data port's configuration to another data port or range of ports. Refer to page 4-15 for additional details.

Note: You may not copy from one Integration unit to another Integration unit.

Link Administration

Reset

If a link (all types) is not working properly it can be reset. If the other end of the link is a MICOM mux, the mux will also reset. Note that all channels currently using the link will experience a temporary interruption. From the Command Facility Main Menu, proceed with the following steps:

```
COMMAND FACILITY MAIN MENU
 10   RESET
```

```
RESET
  2   LINK
```

```
   ENTER LINK CHANNEL # (^X TO ABORT):
```

If the link is configured for frame relay, an additional menu will display (refer to page 3-34).

Status/Statistics

Accessed from the Command Facility, the Status/Statistics menu provides link information in the following options:

Option	Description
Node Status	Lists the current node IDs and numbers, ports and link types of nodes attached to the local unit and all node IDs and numbers of the units in the network.
System Statistics	Provides a demand or last period report on the system which includes the following link information: frame counts, utilization of composite and buffers, retransmits and line alarms. Also it gives the time (in seconds) for system flow control, sync loss, and CD (carrier) loss. For X.21 links, it displays the number of call attempts across the link. For frame relay links, it displays Transmit and Receive Character and frames.

Refer to Section 6, Administration, for additional information.

Channel Priority on Composite Links

By default, integral voice/fax channels have priority for transmission across the link followed by sync, and then LAN and async data. LAN and async have equal priority. This scheme minimizes delay for voice/fax and sync connections. There are occasions when a sync channel may need to have bandwidth priority over voice/fax. To accomplish this, it is necessary to configure the sync channel (both local and remote ports) for high priority (option number varies depending on protocol, refer to Table 4-1, page 4-9) and the voice/fax channel for low priority (refer to voice/fax manual). For sync and voice/fax channels to have equal priority, set them both for high priority.

Note: A sync channel(s) configured as TDM has reserved bandwidth which is not shared. The priority function noted above does not apply to a TDM channel.

Channel Configuration 4

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- Sync Channel Protocol Menu 4-3
- Sync Channel Characteristics 4-5
- Sync Bandwidth Management 4-10
- Control Signals 4-11
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Async Channels 4-16
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  - Autobaud Rate Detection (ABR) 4-18
  - Code Level and Parity Conversion 4-19
- Async Channel Features 4-20
- Async Channel Extended Features 4-21

This section describes the configuration of the channels — synchronous and asynchronous. Configuration instructions for optional modules such as voice/fax, LAN, ISU, and modems are described in their respective manuals.

Appendix B contains blank worksheets which can be used to record the sync and async configuration.

Port Configuration Menu

This menu assigns a particular channel or link type to the port. Ports A2 through D12 are by default async.

```
COMMAND FACILITY MAIN MENU
  3   CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES
  1   PORT CONFIGURATION
```

Enter the node ID, a slash, and channel number.

```
ENTER NODE-ID/CHANNEL # (^X TO ABORT): !240/A4
```

Select 1 or 2. (For other options, refer to Section 3.)

Async – refer to page 4-16
Sync – refer to page 4-3

```
PORT CONFIGURATION
  1   ASYNC
  2   SYNC
```

Important

After configuring the port, reset the unit (from the Command Facility Main Menu).

Reset Node

```
COMMAND FACILITY MAIN MENU
  10   RESET
```

```
RESET
  1   NODE
```

```
ENTER "Y" TO CONFIRM OR "N" TO ABORT: Y
```

```
PARAMETER RESTORATION
  2   CURRENT CONFIGURATION
```

Sync Channels

The ports that can be configured as sync are A2-A6[1] on the CCM and all ports on the 5000E/6 and 5000E/6DMA[2] CEM modules. Sync channels are only supported as direct attachments to an Integration unit (not MICOM muxes).

CAUTION

- **Sync channels are not switchable and *must* be force connected**, refer to page 5-3 for this procedure.
- Unless you have an NMS module installed, you must leave one port configured for async (to access the Command Facility).

Sync Channel Protocol Menu

When you configure a port for sync (page 4-2), the following protocol options will display:

Option	Description
1. DLC	For SDLC and HDLC.
2. ASCII Bisync	Use with the following considerations: a 7-bit ASCII code with parity, with either one or two bytes longitudinal redundancy check (LRC) or a block check character (BCC), and a minimum of two pad characters following each transmission having the value of 'FF' (hexadecimal).
3. EBCDIC Bisync	Use with IBM 3270, 2780 and 3780 protocols.
4. H-P Sync	Host-to-host sync data transfer which runs a modified form of ASCII Bisync.
5. RTS/CTS	For half-duplex customized or *non-standard* control sequences. Data is passed through the system according to MICOM proprietary algorithms. Transmission is independent of the line protocol and may be used with any sync protocol.
6. Sync-Pad	For customized or *non-standard* control sequences. It can run full or half duplex. You configure the value and number of pad characters for the end of block and the unit interprets it as such.

[1] All models except the Marathon 2K and 3K. Marathon 2K: either A2 or A3 – only one at a time can be sync. If A2 is configured for sync, A3 cannot be, and vice versa. Marathon 3K: only A2 and A3 may be sync.
[2] Marathon 10K and 20K support the 5000E/6DMA module.

Option	Description
7. MICOM DLC	For use when the unit is cascaded with MICOM muxes. All external multiplexers must have all ports configured for asynchronous channels.
8. MICOM Voice	Select when an external Advanced Packetized Voice digitizer with DLC protocol (APV1/DLC) is to be used. This protocol is a modified DLC protocol with block size set to 1024 bytes and a default data rate of 9600 bps.
9. Fast Packet	Protocol insensitive (transparent) and compresses repeated character strings. Utilizes statistical multiplexing techniques across the composite link such as other sync protocols (such as DLC and BISYNC). If the use of the equipment is at maximum, you may wish to select the TDM option, which reserves bandwidth.
10. TDM	Protocol insensitive. Designed for priority devices which require reserved bandwidth across the composite link (dedicated bandwidth).

Note

Tail circuits are supported at rates up to 38.4 Kbps when one side is set for internal clocking and the other side is set for external clocking. Do not configure a higher data rate.

Notes:

- Once you have completed your selection from the menu, you **must** do a node reset selecting the *current configuration* option. You may configure all sync ports before performing a reset.
- If you change protocols, be sure to configure both ends of the channel with the same protocol. Perform a node reset on both units. (When changing protocol, the channel cannot be connected*.)*

Sync Channel Characteristics

Follow this menu path to set the a sync channel characteristics.

```
COMMAND FACILITY MAIN MENU

 3   CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES

 3   SYNC CHANNEL
```

Enter your sync channel number.

```
ENTER NODE ID/CHANNEL # (^X TO ABORT): NODE_A/A2
```

```
SYNC CHANNEL CHARACTERISTICS

(see Table 4-1)
```

Note: If you see `CONFIGURATION INHIBITED` and `WRONG CHANNEL TYPE` messages, it is likely that a reset was not performed after changing the port configuration to sync. Abort this process and perform a node reset before returning to this sequence.

Each sync protocol (selected during port configuration) has a different Sync Channel Characteristics menu. Table 4-1 describes all of the options on all of the menus.

Note: For the 5000E/6 modules, do not exceed a sync data rate of 19,200 bps.

Protocol	Marathon 2K, 2K *Plus*	Marathon 3K, 5K Turbo, 10K and 20K
ASCII Bisync, EDCDIC Bisync, H-P Sync	1200-19,200	1200-19,200[1]
RTS/CTS, MICOM DLC, Sync-Pad[2]	1200-19,200	1200-48,000[1]
DLC	1200-19,200	1200-64,000
MICOM Voice	9600-14,400	9600-14,400
Fast Packet	1200-38,400	1200-64,000
TDM[3]	1200-38,400	1200-64,000

1 System displays up to 64,000, but do not select more than the above stated rate.

2 It is recommended that you increase the number of Trailing Pad Characters to the maximum for higher data rates (19.2 Kbps and higher).

3 Tail circuits on TDM are supported at rates up to 38,400 bps when one side is set for internal clocking and the other side is set for external clocking. Do not configure a higher data rate.

Table 4-1. Sync Channel Characteristics Option Selections

Option Name	Option Number	Protocol	Default	Description
Data Rate	1	DLC, ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS, Sync-Pad, MICOM DLC, Fast Packet, TDM	2400	Sets data rate (in bps) for the user channel. See table on page 4-5 for available rates.
		MICOM Voice	9600	
Channel Clocking	2	DLC, ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS, Sync-Pad, MICOM DLC, MICOM Voice, TDM	Tx-Internal/ Rx-Internal	Sets the port's source for a receive and transmit clock.
Maximum Transmit Block Size[1]	3	DLC, ASCII Bisync, EBCDIC Bisync RTS/CTS, Sync-Pad	512	Sets the block size in bytes of the data to the unit from the attached device.
		H-P Sync	9876	
		MICOM Voice	1024	
Maximum Receive Block Size[1]	4	DLC, ASCII Bisync, EBCDIC Bisync RTS/CTS, Sync-Pad	512	Sets the block size in bytes of the data to the attached device from the unit.
		H-P Sync	9876	
		MICOM Voice	1024	
Interface Type	5	DLC, ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS, Sync-Pad, MICOM Voice	To DTE	Sets a port for To DTE to interface with data terminal equipment, and for To DCE to interface with data communications equipment such as a tail-circuit modem.
	3	MICOM DLC, TDM		
Carrier Mode	6	DLC, ASCII Bisync, EBCDIC Bisync, H-P Sync, Sync-Pad, MICOM Voice	Constant	Defines when carrrier is held high, either constant or variable. (TDM and Fast Packet are set for constant and are not configurable.)
		RTS/CTS	Variable	
	4	MICOM DLC	Constant	

[1] Prompt only, no menu.

Table 4-1. Sync Channel Characteristics Option Selections (continued)

Option Name	Option Number	Protocol	Default	Description
Sync Character[1]	7	ASCII Bisync	16	Sets the value of the leading sync character for the start of the block.
		EBCDIC Bisync	32	
		H-P Sync	16	
		RTS/CTS	FF	
	2	Fast Packet		
	4	TDM		
Sync Character[1]	#1 7	Sync-Pad	16	Sync character must match the 16-bit hexadecimal synchronization sequence.
	#2 8			
Number of Leading Syncs[1]	8	ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS	3	Sets the number of leading sync characters that the unit will generate on the output (0-9). This will allow the device on the selected channel to synchronize. Enter 0 to specify leading syncs as *transparent*. (Leading sync characters will not be *stripped out*.)
	9	Sync-Pad		
Pad Character[1]	9	ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS	FF	Sets the value of the pad character (any alpha or numeric character). It precedes the sync character and follows the end of the block. It is used to pad the block.
	10	Sync-Pad		
Number of Leading Pad Characters[1]	10	ASCII Bisync, EBCDIC Bisync, H-P Sync	1	Sets the number of leading pad characters to be transmitted at the start of the block. This is used for a time delay (1-9).
		RTS/CTS	3	
	11	Sync-Pad	1	
Number of Trailing Pad Characters[1]	11	ASCII Bisync, EBCDIC Bisync, H-P Sync	2	Sets the number of trailing pad characters to be transmitted at the end of the block (1-9).
		RTS/CTS	3	
	12	Sync-Pad[2]	2	

[1] Prompt only, no menu.
[2] For sync-pad protocol, you can configure 1-20.

Table 4-1. Sync Channel Characteristics Option Selections (continued)

Option Name	Option Number	Protocol	Default	Description
Buffer Control	9	DLC	None	Used to regulate data transmission from a device attached to a user channel depending on the system buffer utilization.
	12	ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS		
	13	Sync-Pad		
	7	MICOM Voice		
	5	MICOM DLC		
Encoding	7	DLC	NRZ	Selects one of the two types of encoding, NRZ or NRZI, depending on the attached device.
Idle Fill	8	DLC	Flag Fill	Selects the unit output when the line is idle. • for IBM 3270 half-duplex, select *markfill*. • for AS/400 applications, set either *auto fill* (Modulo 8) or *A128 fill* (Modulo 128).
Clock Flow Control	10	DLC	Enable	Selects whether or not the local channel will use clocking to control attached device.
	13	ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS		
	14	Sync-Pad		
	6	MICOM DLC		
	8	MICOM Voice		
DSR Control	11	DLC	Normal	Selects whether the remote DTR changes appear on the local DSR or are ignored.
	14	ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS		
	15	Sync-Pad		
	7	MICOM DLC		
	9	MICOM Voice		
	3	Fast Packet		
	5	TDM		

Table 4-1. Sync Channel Characteristics Option Selections (continued)

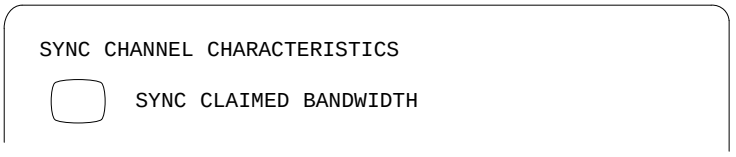
Option Name	Option Number	Protocol	Default	Description
Priority	12	DLC	Low	Selects the priority of the port, high or low.
	15	ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS		
	16	Sync-Pad		
	8	MICOM DLC		
	10	MICOM Voice		
	4	Fast Packet		
Sync Claimed Bandwidth[1]	13	DLC	0	0-64000 bps; 0=disable feature. Sets the amount of bandwidth (in bps) reserved for the port. The port that initiates the force connect (the *from node/channel*) sets the bandwidth claim for the channel.[2] Since the maximum available bandwidth differs by protocol, refer to the table on page 4-5 for additional information.
	16	ASCII Bisync, EBCDIC Bisync, H-P Sync, RTS/CTS		
	17	Sync-Pad		
	9	MICOM DLC		
	11	MICOM Voice		
	5	Fast Packet		

Note: To return to the previous menu, Configure Local Nodes, enter a **P**.

[1] Prompt only, no menu.
[2] If done in Command Facility. If NETMan makes the connection, either side could establish claimed bandwidth.

Sync Bandwidth Management

This feature permits you to budget the available link capacity for connections through the network. By assigning an appropriate claim for bandwidth, you prevent excessive overbooking of the link. When all link capacity is claimed, subsequent connections will not be completed (remain in CIP state).



This feature is available on all protocols except TDM and on sync connections where both sides are Release 4.0 or later. In the event that the link does not have enough bandwidth available for a requested sync connection, the connection will not be completed. This feature is enabled in the Sync Channel Characteristics menu via the Sync Claimed Bandwidth option. When you select that option, the following prompt will display:

```
ENTER SYNC CLAIMED BANDWIDTH [   0]:
```

Enter the amount of bandwidth in the range of 1-64000 (bps) required for the sync channel. The last number (ones column) rounds to the lowest 10; for example: You configure 1001, the display will show 1000; when configured for 1026, it will display 1020.

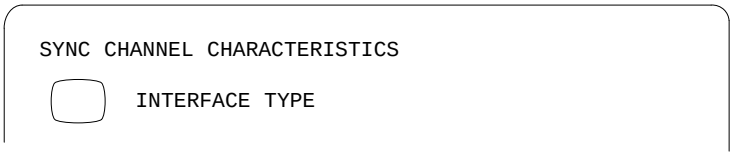
The port that initiates the connection is the one that sets the claimed bandwidth value for the channel. This means that when you force connect two ports from the Command Facility, the one which is input first (at the *from node*/*channel* prompt) is always the initiating port. In the case of NETMan, the initiating port may be either port; therefore, it is recommended that this parameter be set to the same value on each end of the channel. If the feature is enabled, the sync channel will make a switched virtual circuit (SVC) at the time of force connection; its path will be fixed through the network. The feature can be disabled by entering a zero (0) at the prompt; this is the default. If the feature is disabled, data will be sent via a datagram which means the path of the connection may change due to network congestion.

Should the port's configuration be altered while the port is force connected, the new values will not take effect until the port is force connected (reconnected) again.

Control Signals

A synchronous channel supports four control signal pairs necessary to support both direct-connected and modem applications: DTR/DSR, BO/RI, RTS/CD and Pin 11/CTS. The first two pairs (DTR/DSR and BO/RI) are passed end to end in the network; their levels are set by the attached devices. The last two (RTS/CD and Pin 11/CTS) are interpreted and generated locally by the unit. The particular operation of these signals depends upon the protocol selected, interface type and the carrier mode configured by the operator.

To DTE/To DCE Channels



Each port must be configured independently at each end. This allows the flexibility for a *TO DTE* interface to a computer and for a *TO DCE* interface to a tail circuit modem. See Tables 4-2 and 4-3 for pin assignments and DCE and DTE local channel interfaces.

When a port is configured TO DCE, CTS must be *on* from the attached modem (to enable output from the unit). This allows for the RTS/CTS delay, which varies on different modems.

When a port is configured TO DTE, the unit turns CTS *on* in response to RTS *on* from the attached terminal equipment. If CTS buffer control is selected, CTS may be delayed up to 250 ms after RTS is raised. See Tables 4-2 and 4-3 for pin assignments and DCE and DTE local channel interfaces.

Table 4-2. CCM and 6-Channel CEM[1] Local Sync Channel Interface Configured to DTE

Marathon Pin	Marathon I/O	Constant Carrier Mode	Controlled Carrier Mode	DTE Pin	DTE I/O	DTE Signal
4	I	*Off*-to-*on* transition raises CTS. *On*-to-*off* transition forces CTS off.		4	O	RTS
5	O	Set *on* after RTS goes *on*. Set *off* when RTS goes *off*.		5	I	CTS
8	O	Forced *on*	Set *on* when unit has output data. Set *off* when all data delivered.	8	I	CD
22	O	2 Seconds *on*/4 seconds *off* when *start ring* frame received from remote unit. It is held *off* when *stop ring* frame is received from remote unit or when DTR is *on* (Bell 103 emulation).		22	I	RI
20	I	Send changes to remote unit as detected. DTR *on* holds RI *off*.		20	O	DTR
6	O	Change as detected by remote unit.		6	I	DSR
25	I	Send changes as detected by remote unit.		25	O	Busy
11	I	Not used	Not used	11	O	Unassigned
15	O	Not affected by carrier mode.		15	I	Tx Clock
17	O	Not affected by carrier mode.		17	I	Rx Clock
18	I	Not affected by carrier mode.		18	O	External Rx Clock
24	I	Not affected by carrier mode.		24	O	External Tx Clock

Key:
I = Input
O = Output

[1] 5000E/6 and 5000E/6DMA sync/async module only

Table 4-3. CCM and 6-Channel CEM[1] Local Sync Channel Interface Configured to DCE

Marathon Pin	Marathon I/O	Constant Carrier Mode	Controlled Carrier Mode	DTE Pin	DTE I/O	Signal
8	O	Held *on*	Leads output data.	4	I	RTS
11	I	. . .	Must be *on* to enable data output.	5	O	CTS
4	I	. . .	Ignored (except in RTS/CTS mode)	8	O	CD
25	I	Start ring frame is sent to remote when off-to-on transition is detected. Stop ring frame is sent to remote if no transition is detected for three seconds.		22	O	RI
6	O	Change as detected by remote unit.		20	I	DTR
20	I	Send changes as detected to remote unit.		6	O	DSR
22	O	Changes as detected by remote unit.		25	I	Busy
5	O	. . .	Follows unassigned input at remote end.	. . .	. . .	Unassigned
15	O	Not affected by carrier mode.		. . .	. . .	External Rx Clock
17	O	Not affected by carrier mode.		24	I	External Tx Clock
18	I	Not affected by carrier mode.		15	O	Tx Clock
24	I	Not affected by carrier mode.		17	O	Rx Clock

Key:
I = Input
O = Output

[1] 5000E/6 and 5000E/6DMA sync/async module only

Channel Clocking Signals

The receive/transmit clock signals may be set to one of four combinations: Tx-Internal/Rx-Internal, Tx-Internal/Rx-External, Tx-External/Rx-Internal, Tx-External/Rx-External. See Table 4-4 for applications of the clock signals.

Important

The data rate ***must*** be configured the same as that of the external clock source.

Table 4-4. Synchronous Clocking

Configuration Type	Description of Use	Cable Diagrams for Clocks[1]	MICOM Cable Model Number
Normal Synchronous or Cascade To DTE Tx Clock Internal Rx Clock Internal	Used when DTE is co-located with unit. Unit supplies Tx and Rx clocks.	Unit DTE 15 — Tx Clock → 15 17 — Rx Clock → 17	5000C/5340 5000C/5343
Normal Synchronous To DCE Tx Clock External Rx Clock External	Used when tail circuit synchronous modem or DCE is attached to unit. DCE supplies both clocks.	Unit DCE 15 & 17 not used 18 ← Rx Clock — 15 24 ← Tx Clock — 17	5000C/5341
Normal Synchronous To DCE or DTE Tx External Rx Internal	Used when attached device is providing the Tx clock and the unit is providing the Rx clock.	Unit DCE/DTE 15 → [2,3] 17 — Rx Clock → [2,3] 24 ← Tx Clock — [2]	Depending on attached device 5000C/5340 (DTE) 5000C/5341 (DCE) 5000C/5343 (DTE)
Special Synchronous To DCE or DTE Tx Internal Rx External	Used when attached device is providing the Rx clock and the unit is providing the Tx clock.	Unit DCE/DTE 15 — Tx Clock → [2] 17 → [2,3] 18 ← Rx Clock — [2]	Customer supplied cable

[1] Tx clock and Rx clock are used to indicate on which lines the unit supplies or accepts the transmit and receive clock signals. The Tx and Rx clocks are always named respective to the port.

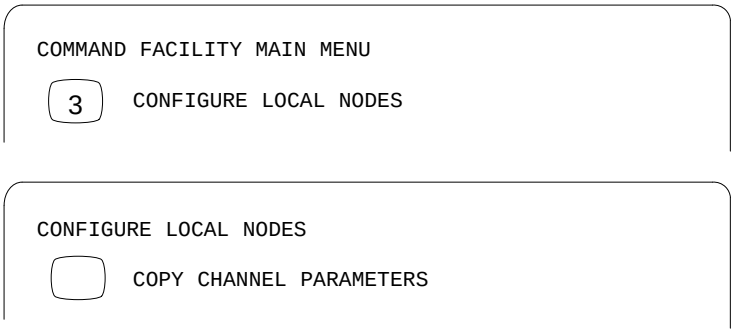
[2] Pin assignments depend on the attached device.

[3] Unit will output the clock.

Copy Channel Parameters

By using the copy channels selection you may configure a single port or range of sync, async or voice/fax ports. This option can save you time if the ports you are configuring match (or closely resemble) a port you have already configured. You may copy parameters within the unit or to a locally-connected MICOM mux; you cannot copy to another Integration unit.

Note: Source and destination ports must be a like kind (async to async, sync to sync) and protocol (sync DLC to DLC). If they are not, an error message will display and you must start again.



Enter your source channel number.

```
ENTER SOURCE NODE ID/CHANNEL # (^X TO ABORT): NODE_A/B1
```

Enter your destination (either a single port or a range of ports).

```
ENTER NODE ID/CHANNEL (OR RANGE OF CHANNELS)
(^X TO ABORT): NODE_A/B2
```

You can now return to the channel configuration menu and modify specific parameters if necessary. You should verify the configuration. Refer to View Configuration, page 6-12.

Async Channels

Ports (channels) A2-A6 and all CEM module ports are by default async. It is unnecessary to configure those ports which are by default async, unless they have been configured as sync or a link. If port configuration is necessary, be sure to do a node reset.

To access the Async Channel menu, follow this path:

```
COMMAND FACILITY MAIN MENU
  3   CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES
  2   ASYNC CHANNEL
```

Enter your async channel.

```
ENTER NODE ID/CHANNEL # (^X TO ABORT): NODE_A/B5
```

```
ASYNC CHANNEL
    1.  CHANNEL CHARACTERISTICS
    2.  CHANNEL FEATURES
    3.  EXTENDED FEATURES
    4.  SWITCHING PARAMETERS
```

The Async Channel menu is displayed showing four menu options:

- Channel Characteristics refer to page 4-17
- Channel Features refer to page 4-20
- Extended Features refer to page 4-21
- Switching Parameters refer to page 5-11

Note: Parameter changes on switched ports will take effect after the port is disconnected; parameter changes on force-connected ports will take effect immediately.

Async Channel Characteristics

The pathway to this menu is shown on page 4-16. The options are similar to the Local Channel Configuration menu (from Command Mode).

Option	Default	Description
1. Data Rate	9600	Sets the data rate (in bps) for the port. (ABR=autobaud rate detection, refer to page 4-18.) **Note**: It is recommended that ports attached to a host port be set for a fixed speed.
2. Code Level	8	Sets the bits per character for data and messages.
3. Parity	None	Depending on the code level selected, displays one of two possible parity menus. (Refer to page 4-19.)
4. Stop Bits	1	Selects the number of stop bits inserted at the end of a character.
5. Echo	Off	Enables or disables the echo function[1].
6. Channel End to Host/to Terminal	Terminal	Configures the port for a host or a terminal connection.
7. XON Character	DC1	Selects the character for the XON function.
8. XOFF Character	DC3	Selects the character for the XOFF function.
9. Buffer Control	XON/XOFF	Sets the method the unit uses to control data flow from the attached device. (See Appendix G for information on WANGX applications.)
10. Flow Control	XON/XOFF	Sets the method the attached device uses to control data flow from the unit[1]. (See Appendix G for information on WANGX applications.)
11. CR Delay[2]	0	Configures a delay after an Enter, a LineFeed (LF) and/or a Form Feed (FF)[1].
12. LF Delay[2]	0	
13. FF Delay[2]	0	

[1] Valid only for ports configured in option 6 as channel end *to terminal*.
[2] Delay values are configured in number of characters (0-99 characters) to account for required mechanical actions of the equipment attached to the port.

Autobaud Rate Detection (ABR)

The unit has the capability of automatically determining the data rate of a port in the range of 50 – 19200 bps by dynamically examining the first (sign-on) character. In addition, the unit will pass the sign-on character to a host computer, if the port configuration is set in the following manner:

- *Port where the sign-on character is originated.*

  Data Rate = ABR

  Channel End To Host/To Terminal = Terminal

- *Port where the sign-on character is received.*

  Data Rate = ABR

  Channel End To Host/To Terminal = Host

Table 4-5. Autobaud Rate Sign-on Characters

Rate	Code Level (bits)	Stop Bits	ABR Sign-on Character
50	5	1.5	Enter
75	5	1.5	Enter
110	8	1	Enter
150	8	1	Enter
200	8	1	Enter
300	8	1	Enter
600	8	1	Enter
1200	8	1	Enter
1800	8	1	Enter
2400	8	1	Enter
4800	8	1	Enter or Space
9600	8	1	Enter
19200	8	1	Enter

Code Level and Parity Conversion

The unit's code level includes parity in its data bits as shown in the following table.

Unit		Actual	
Code Level[1]	**Parity**	**Data Bits**	**Parity Bit[2]**
9	E,O	8	E,O
8	N	8	N
8	E,O,M,S	7	E,O,M,S
7	N	7	N
7	E,O,M,S	6	E,O,M,S
6	N	6	N
6	E,O,M,S	5	E,O,M,S
5	N	5	N

Key: E = Even O = Odd
M = Mark S = Space
N = None

[1] includes parity bit
[2] N = no parity bit; E, O, M, S = 1 bit

The code level on each side of the channel (local and remote ports)

- must be the same
- must match the attached devices.

Note: If you select a code level of 5 or 6: ABR (data rate) and XON/XOFF (flow control) is not supported. For code level 5, you must set the parity to *none*.

Parity Conversion

Parity conversion is supported for all switched and force-connected async ports (Release 3.0 and later). Space, mark, even, and odd need not match on the local and remote end of the channel. Parity errors will be detected on channels configured for *odd* or *even* parity regardless of the code level; those characters will be discarded. Channels with characters configured for *mark, space* or *none* will be forwarded, even if received in error.

Important

To interface and remain transparent with a MICOM mux or a Release 2.5 unit, both ends of the channel must have the same code level and parity (parity conversion is not supported). Additionally, the devices at each end *must* match.

Async Channel Features

The pathway to this menu is shown on page 4-16. The following options are available:

Option	Default	Description
1. Priority	High	Determines whether port is high or low priority in reference to other async ports.
2. EIA Control	Enable	Offers the option of recognizing or ignoring the control signals from the attached device.
3. Smooth Scroll	Off	Supports the DEC VT100 Smooth Scroll terminals.
4. Tandem	No	Supports Tandem Non-Stop computer data flow operation. (Refer to Appendix E for additional information.)
5. Flow Control Strip	Pass	Either *passes* or *strips* the flow control signals.
6. HP ENQ/ACK	No	Supports the Hewlett Packard HP-3000 View Systems. (Refer to Appendix E for additional information.)
7. Sync Loss Disconnect	No	Determines whether a channel will be disconnected in the event the unit detects a sync loss on a link to which the port is connected.
8. Command Mode Entry Sequence	^X Break	Determines the keying sequence available to the channel user for accessing the Command Mode.
9. Command Mode Access	Enable	Enables/disables access to the Command Mode for the port being configured.
10. Command Facility Main Menu Access	Enable	Enables/disables access to the Command Facility Main Menu for the port being configured.
11. Local Channel Configuration	Enable	Enables/disables access to the Local Channel Configuration menu for the port being configured.

To return to the previous menu (Async Channel menu), enter a **P**.

Async Channel Extended Features

The pathway to this menu is shown on page 4-16. The following options are available.

Option	Default	Description
1. Data Compression	Enable	Selects whether compression will be enabled. When enabled, the unit compresses a block of data when transmitting and decompresses the data when receiving. Fewer bytes are required for the transfer, which increases the composite throughput. Adaptive Huffman Compression algorithms are used. Both local and remote ports must be configured for data compression.
2. Remote CTS Control	Forced On	Allows the remote CTS signal to be Forced On or transparent. Specific use is for ports which are force connected. Selection depends on attached devices (Forced On for DTE devices and Normal for DCE devices).

Switching Configuration 5

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Actual *switching functions* are for async and voice/fax channels; every sync channel *must* (and the others *may*) have a force connection. Appendix B contains blank worksheets to record your switching configuration.

Switching Control

The Switching Control menu controls the async, sync, and voice/fax ports and their connections.

```
COMMAND FACILITY MAIN MENU

  5   SWITCHING CONTROL
```

When selected you will be offered the following options:

Option	Description
1. Disable Channel	Takes the async or voice/fax port out-of-service.
2. Enable Channel	Puts the async or voice/fax port into service.
3. Force Connect	Connects two idle or out-of-service ports or range of ports. (Use Force Disconnect option to break a force connection.)
4. Force Disconnect	Disconnects two ports (or a range of ports) which have been force connected.

Force Connections

Force connecting async and sync channels is the same. The two ports to be connected must be the same type (i.e., async to async, sync to sync, etc.). If a port is force connected, no other channel may access it through switching calls. **Do not force connect a LAN module**. For specific information on async, refer to page 5-7; for sync, refer to page 5-6.

Making Force Connections

To make a force connection, follow this path through the menus.

```
COMMAND FACILITY MAIN MENU

 5   SWITCHING CONTROL
```

```
SWITCHING CONTROL

 3   FORCE CONNECT
```

Enter the channel number that is local to the Command Facility.

```
ENTER FROM NODE/CHANNEL # (OR RANGE OF CHANNELS)
(^X TO ABORT): NODE_A/B6
```

Note: If force connecting DLCIs, be sure to include the DLCI number following the port (for example, Node_A/B6.2132).

You must be in the Command Facility of the node from which the force connect is going to be made. Otherwise, an `ILLEGAL INPUT` message will be displayed.

Enter the *to* channel (or channel and DLCI).

```
ENTER TO NODE/CHANNEL # (^X TO ABORT): NODE_B/C4
```

When successfully connected, the Switching Control menu is redisplayed.

Notes:

- If you force connect a channel already force connected, the new connection overrides the old connection.
- Do not force connect ports that you know are inoperative or not in use. It may have an effect on the bandwidth use.
- If you force connect voice/fax ports, the bandwidth setting (voice activated, continuous, or dynamic) and the digitizing rate must match at each end of the channel.

Force Connecting a Range of Channels

This feature allows the connection/disconnection of two or more ports regardless of their current states (in service, out of service, or idle).

CAUTION

All current connections, regardless of connection method (i.e., class, matrix, or force connected) will be terminated.

Important

Marathon 3K units should only use this feature when connecting to another Marathon 3K. All other models, when force connecting with a Marathon 3K, should do so one port at a time.

When the following prompt is displayed:

```
ENTER FROM NODE/CHANNEL # (OR RANGE OF CHANNELS)(^X TO ABORT):
```

the *from* range defines the number of ports in the range. It must be local to the Marathon node.

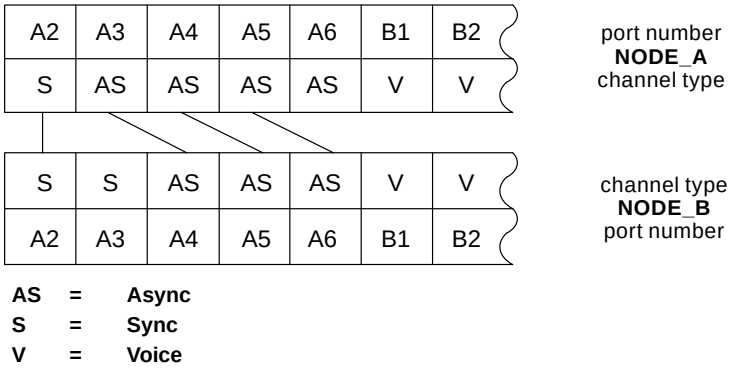
When the next prompt is displayed:

```
ENTER TO NODE-ID/CHANNEL # (^X TO ABORT):
```

the *to* defines where the range begins on the *to* node.

The ports in the *from* and *to* nodes will be paired. In the following example, NODE_A will attempt to connect seven ports to NODE_B; four ports will actually be connected.

from range = NODE_A/A2-B2 (7 ports)
to range = NODE_B/A2 (beginning at port A2)



- Sync port A2 in NODE_A connects to the first like port in the *to* range (sync port A2 in NODE_B).
- NODE_A/A3 cannot connect to the next port in the *to* range, NODE_B/A3, because they are unlike ports (an async port cannot connect to a sync port).
- NODE_A/A3 matches and connects to the next port in the *to* range, NODE_B/A4.

Important

If a port within the specified range (either *from* or *to*) is connected to either the Command Facility (via $CMD) or NETMan, it will not be force connected.

Disconnecting Force Connections

Disconnecting force connections is the same for all channels. Follow this menu path to disconnect a port:

```
COMMAND FACILITY MAIN MENU
 5   SWITCHING CONTROL
```

```
SWITCHING CONTROL
 4   FORCE DISCONNECT
```

Enter the port (or range of ports) you want disconnected.

```
ENTER NODE/CHANNEL # (OR RANGE OF CHANNELS)
(^X TO ABORT): NODE_A/B4-C6
```

For each port disconnected, an event message will be generated. You need only disconnect one side; the other end of the channel automatically disconnects.

Note: You can also force disconnect DLCIs that have been force connected.

CAUTION

All current connections will be immediately disconnected if they fall within the range.

Synchronous Connections

Sync ports ***must*** be force connected; the connection may be between the local unit and the remote unit or it may be within the local unit. Sync connections cannot be made to a MICOM mux. Follow the steps shown on page 5-3.

Note:
- To change protocol, you must force disconnect the channel.
- When force connecting, be sure that the protocols match. (Do not attempt to change protocols on one side only.) Be sure to reset the unit after reconfiguration.

To disconnect a channel, select the Force Disconnect option (refer to page 5-5).

Asynchronous Connections

The following five methods of switching connections are supported for async ports:

Force Connection	The network operator configures a dedicated connection between two ports in the network. The user will not have access to any other port when using this method. (Refer to page 5-3, for configuration; and page 5-14, for connection information.)
Fixed Destination	The network operator configures the destination for the user's channel. (Refer to page 5-11, for configuration; and page 5-14, for connection information.)
Class	At the ENTER CLASS prompt the user enters a mnemonic, configured as a *class name,* which is defined as one or more ports in the network. (Refer to page 5-7, for class information; and page 5-15, for connection information.)
Node/Class	At the ENTER CLASS prompt the user enters the destination node and the class desired. (Refer to page 5-7, for class information; and page 5-16, for connection information.)
Matrix (Node/Channel)	At the ENTER CLASS prompt the user enters the destination node and channel number desired. This can be done by any port not configured as a force connect or fixed destination. (Refer to page 5-17, for connection information.)

Async Force Connections

In async force connections, the configuration of the port need not exactly match, however, both ports must be configured as async (and for the same character set). If a port is force connected, no other port may access it through switching requests.

The procedure to force connect two async ports is described on page 5-3. Once force connected, the Command Facility is accessed via **^X <break>** (or **^X^Y**, if enabled). You will not get the ENTER CLASS prompt.

Note: Set the Remote CTS Control (Extended Features menu) for the device attached to the port(s). If it is not, it may not be possible to connect to the Command Facility once the force connection is made.

Classes

Classes may be viewed as hunt groups, where the user will be connected to any of the available ports in the group. A name is assigned to a group of one or more ports that may be used for similar purposes by network users (e.g., all ports connected to a specific application may be contained in a class). The maximum number of classes per unit is 64.

Classes provide the following features:

- Password protection on destination port access
- Configurable class messages
- Disconnection on inactivity timer (no data activity timeout)
- Port contention handling through first-come, first-serve queues (camp-on queues)
- Secondary class is used if all ports in the primary class are busy.

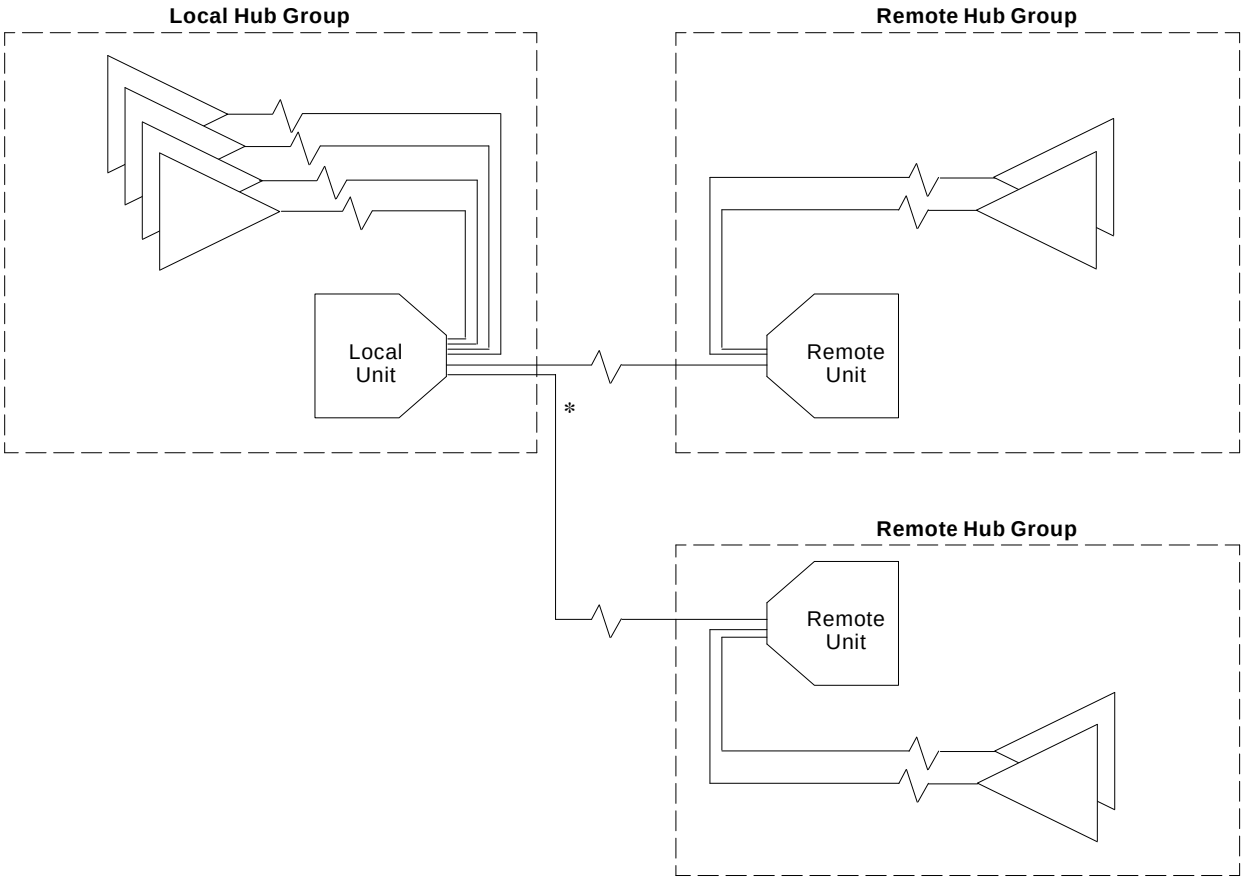
A port is attached to only one class. A class does not need to be exclusive to any node – multiple nodes may offer the same class. In fact, this is desirable if multiple ports on multiple nodes are connected to the same application.

How the Class Request Works

When a class request is made, the process is as follows:

- Search through local hub group for primary class, then secondary class. If no available ports on local hub group, unit will place the call in queue for any available primary port or secondary class port.
- A call is made to remote unit(s), a `CALL IN PROGRESS` message displays. The unit searches the primary, then secondary class. If no available ports, unit will place the call in queue.
- When a connection is made, all other pending queue requests are cleared.

There is no way to determine which remote unit will be connected if class exists on more than one remote node.



* Note that Marathon 2K, 2K *Plus* and 3K may only have one interconnect link.

Planning a Class

This first step is defining which ports are to be grouped together and the class name, secondary class, class password and message. The worksheets in Appendix B will help you.

Class Name Syntax	Class names may be up to eight (8) characters long. Only alpha characters (a-z, A-Z), numeric characters (0-9), and the underbar symbol (_) can be used. The first two characters must be alpha. Names are not case sensitive; therefore hp_acctg, HP_ACCTG and HP_Acctg are the same name.

Password Protection

Password protection is available for all ports assigned to a class. If a password is assigned, the user will be prompted for the class password before being allowed to continue. After two unsuccessful password attempts, the call will be disconnected[1]. The factory default value is no password.

Password Syntax	Valid passwords must be alphanumeric characters and have a maximum length of eight characters. To erase a password (after it has once been configured), enter a space and Enter at the password configuration prompt.

Class Message

The Class Message is the message which displays when the user successfully connects to the requested class. By default there is no message.

Class Message Syntax	Up to 31 ASCII characters (except for control characters) may be used. Special rules apply when entering the characters listed below into the class message:

Desired Character for Message	What to Input	Notes
^X	<esc> <ctrl>X	Without the <esc> key, ^X will abort the message.
ESC (escape)	<esc><esc>	To include an escape key in the text, it must be preceded by an <esc>.
; (semicolon)	<esc>;	To include a semicolon in the text, it must be preceded by an <esc>.
(carriage return, line feed)	;	Inserts a carriage return, line feed which counts as two characters.

[1] This is not true for ports configured for dedicated protocol. On dedicated protocol, there is no limitation.

Configuring the Classes

The following is the menu path to configure a class.

```
COMMAND FACILITY MAIN MENU
  3   CONFIGURE LOCAL NODES
```

```
CONFIGURE LOCAL NODES
      CLASS PARAMETERS
```

Class numbers are assigned numerically beginning with 1. If the next class number is not known, view the class list (refer to page 6-12).

```
ENTER CLASS NUMBER (^X TO ABORT):  1
```

Enter a class name (refer to page 5-9 for syntax)

```
ENTER CLASS NAME [current value] (^X TO ABORT): DVNS
```

```
CLASS PARAMETERS MENU
    1.  CLASS NAME
    2.  SECONDARY CLASS
    3.  CLASS PASSWORD
    4.  CLASS MESSAGE
    5.  CLASS NO ACTIVITY TIMEOUT
    6.  DELETE CLASS
```

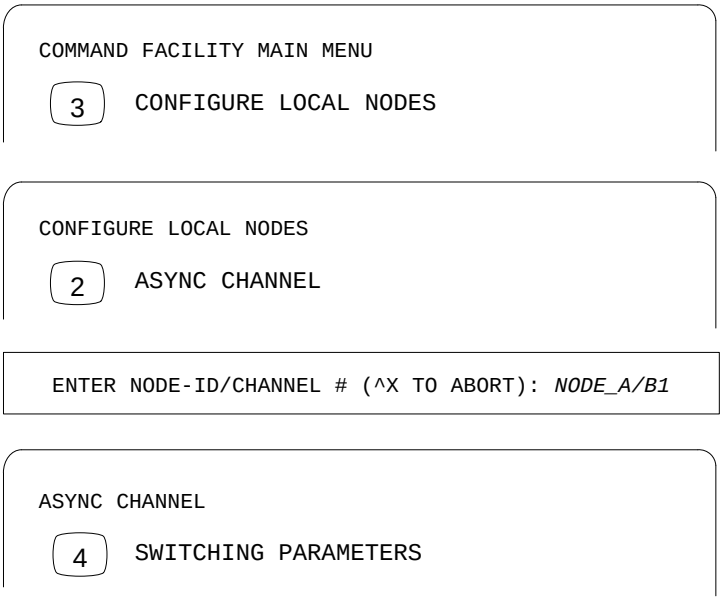
Option	Default	Description
1. Class Name	n/a	Changes the name of this class (refer to page 5-9 for syntax).
2. Secondary Class	0	An alternate group of ports to be searched should all ports in the primary class name be unavailable. This is optional.
3. Class Password	n/a	Password associated with the class. Refer to page 5-9 for syntax.
4. Class Message	n/a	Displays on user's screen after they connect to the class. Refer to page 5-9 for syntax.
5. Class No Activity Timeout	0	A configured period of time (in minutes) after which the system will disconnect the port if there is no activity. The maximum time is 255 minutes. Disable = 0.
6. Delete Class	n/a	Delete a class entirely.

To include a port as part of a class, select option 7 from the Switching Parameters menu and insert the class name.

To define a class that a port automatically connects to, select option 8 from the Switching Parameters menu and insert the class (or node/class) name.

Switching Parameters Menu

To access this menu, follow this path.



The following options are available:

Option	Default	Description
1. Connect Protocol	Dedicated	Selects the connection protocol used. Refer to page 5-13 for details.
2. Unbalanced Rates	On	Allows a connection to operate at different rates (speeds) at each end of the connection. *On* enables this function.
3. Call Inhibit	No	*Yes* inhibits the port being configured from initiating a call, making it a *called* port only.

Option	Default	Description
4. Receive Inhibit	No	*Yes* inhibits the port being configured from receiving a call; therefore this port can only initiate calls (a *calling* port only).
5. Character Set	ASCII	Defines whether an ASCII or non-ASCII character set is defined. If non-ASCII is selected, either a destination class must be configured or Call Inhibit must be *yes*. *Do not configure a password for a non-ASCII configured port*.
6. Matrix Switching	Enable	Permits or prohibits the port from making a matrix switching call connection.
7. Resource Class	n/a	If the port being configured is to be included as part of a class, enter that class at this prompt. If the port is to be assigned to connect to a specific class, enter that name under option 8, Destination Node/Class and leave this option blank.
8. Destination Node/Class	n/a	Defines the destination of the port being configured to a particular node and class. If the port is configured as part of a resource class, leave this option blank.
9. Channel Password	n/a	The password to gain entry to the port being configured (the syntax is the same as for class password). This is unrelated to the class password. The default is no password. Refer to page 5-9, for password syntax.

Connect/Disconnect Protocol, Channel Interfaces

The Connect Protocol menu offers the following three physical connection protocols:

Option	Description
1. Dedicated	Used for terminals or computer ports which operates on data activity only. Must be used on line driver data channels (5000E/12LD).
2. DTR (Data Terminal Ready)	Used for terminals or computer ports which can control DTR to initiate or acknowledge call requests. Allows computer ports to delay incoming calls until ready. Also useful for tail-end leased line async modems where DSR or CD is cross-wired to DTR. (EIA Control must be *enabled*.) **Note**: Any DTR configured terminal should use $CMD to enter the Command Facility.
3. Auto	Used with dial up modems; emulates a dial up modem to a computer port (EIA Control must be *enabled*.)

Feature Matching Capability

Feature matching automatically selects and sets the minimum feature set for the connecting async ports during all switching operations, other than force connections. Those features automatically converted for async channels include the following:

- *Speed*. Called and calling ports do not need to have the same speeds unless unbalanced rates are set to *off*. The unit will flow control the faster port to prevent overrunning the slower port.
- *Flow Control/Buffer Control conversion*. Ports with different flow control and buffer control mechanisms will be converted through the unit.

  Note: Ports using no flow control connecting with those using character flow control (DC1-DC4) may experience problems if the complete ASCII code set is used: The flow control characters will not be stripped out of the data stream.

- *Parity Conversion*. Even, odd, mark and space will be converted automatically at the receiving unit to match the required parity. Parity conversion also works on force-connected channels. Refer to page 4-19 for additional information.

Making A Connection

Force Connection

A force connection is an automatic process, transparent to the user. Refer to page 5-3 for the procedure. To disconnect a force connection, use the Force Disconnect option of the Switching Control menu.

Initial Connection Procedure

For the methods of connection other than force connection, the initial steps are the same for connecting to the unit or its MICOM muxes.

1. Turn on terminal and enter the sign-on character (if applicable).
2. `ENTER PASSWORD` prompt will display (if one has been configured); enter password.

   If configured, the welcome banner will display to show you that the connection to the unit is complete. The `CONNECTED` message will display.

Fixed Destination Connection

If a port is configured for fixed class destination, the unit will automatically attempt to connect to the designated primary class after the initial steps have been completed (see above).

Disconnecting

Press the **<break>** key three times within six seconds.

Class Connection

1. Complete the initial steps on page 5-14.
2. At the ENTER CLASS prompt, enter the class name to which you wish to connect.
3. At the class password prompt, enter the password or a (if no password is configured).
    - *If the port is not available*, the user's screen will display:

Waiting Q=*n*	Ports for that class are in use; you are in queue position *n*. Refer to page 5-18 for additional information.
Unavailable	Class exists, but is not in service.
Unassigned	Class is unknown in the network or the password may be incorrect.

    - *If the port is available,* the Class Message (if configured) and CONNECTED message will display.

Disconnecting

Press the **<break>** key three times within six seconds. The disconnect message will display on the calling port's screen.

Node/Class Connection

1. Complete the initial steps on page 5-14.
2. At the ENTER CLASS prompt, enter the node/class name to which you wish to connect.

   Note: All ports configured for the specified class in this specified unit's hub group will be included in the search.

3. At the class password prompt enter the password or just press Enter (if no password is configured).

   - *If the port is not available*, the screen will display,

Waiting Q=*n*	Ports for that class are in use; you are in queue position *n*. Refer to page 5-18 for additional information.
Unavailable	Class exists, but is not in service.
Unassigned	Class is unknown in the network or password may be incorrect.

   - *If the port is available,* the Class Message (if configured) and CONNECTED message will display.

Disconnecting

Press the **<break>** key three times within six seconds. The disconnect message will display on the calling port screen.

Matrix Connection

Notes:
- Do not attempt to matrix connect to any force connected port.
- Matrix switching can be disabled on a per channel basis (Switching Parameters menu).

1. Complete the initial steps on page 5-14.
2. At the ENTER CLASS prompt, enter the full node ID/channel number of the port to which you wish to connect.
3. If the destination port has been configured as a class, you will be prompted for a class password; enter the password.
   - *If the port is not available*, the screen will display,

Busy	Port is in use, try again.
No Answer	No answer from the destination port. • Remote port did not respond to connection protocol. • No response within the call time out period, although port is known by the local unit.
Unavailable	Port exists, but is not in service or receive inhibit is enabled.
Unassigned	The node or port is unknown to the network or the password may be incorrect.

   - *If the port is available,* the Class Message (if configured) and CONNECTED message will display.

Disconnecting

Press the **<break>** key three times within six seconds. The disconnect message will display on the screen.

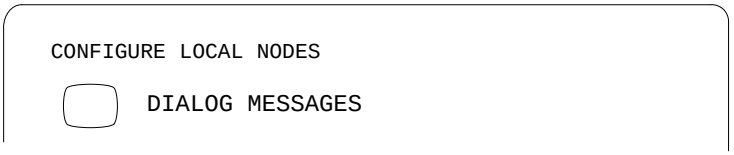
Port Contention/Queueing

Port contention allows multiple users access to a limited number of resources. If a port in the class is unavailable, the user will be placed in queue for the busy ports in the primary or secondary class.

Once in the queue, the user may receive the current queue message (`Waiting Q` = your place in the queue) by typing in any printable ASCII character or a Enter. The user may also exit the queue (and return to the resource prompt) by typing a **<break>** key.

Dialog Messages

These are configurable messages and prompts displayed for confirmation, requesting input or for information during asynchronous switching operation. Some dialog messages have a default message, others do not.



Option	Default	Description
1. Channel Password	Enter Password:	Asks the user for password associated with the sign-on port. It is the first dialog message that appears on the user's screen when attempting connection to the network. If no password is defined, this message will not display. Maximum length = 31 characters.
2. Welcome	(No default message)	Sent to a port when the user first successfully connects to the unit. Maximum length = 58 characters.
3. Class Request	Enter Class:	Asks user for class name of the destination port. Maximum length = 31 characters.
4. Class Password	Enter Class Password:	Asks for password of the requested class. Maximum length = 31 characters.
5. Connected	Connected	Displays when a connection to any resource is established. Maximum length = 31 characters.
6. Queue	Waiting Q=*n*	Displays when user is waiting in queue for a connect to a port. *n* = your place in queue (i.e., 1, 2, 3). Maximum length = 16 characters.

Option	Default	Description
7. Busy	Busy	For matrix connections. Sent to users when requested port is in use. Maximum length = 16 characters.
8. Disconnected	Disconnected	Displays when the call is disconnected. Only sent to the call originator for force connections. Maximum length = 16 characters.
9. No Answer	No Answer	Indicates no answer from destination port. Maximum length = 16 characters.
10. Unavailable	Unavailable	Sent when user requests a resource (port or class) which exists, but is not in service (non-operational). Maximum length = 16 characters.
11. Unassigned	Unassigned	Displays when a node, class, or channel is unknown in the network or the password is incorrect. Maximum length = 16 characters.
12. Incompatible	Incompatible	Sent when any connection is attempted that is not compatible with the configuration. Maximum length = 16 characters.
13. Call in Progress	Call In Progress	Displays while a call is in the process of being connected. Maximum length = 16 characters.
Dialog Message Syntax	Alphanumeric characters (A-Z, 0-9), spaces and all symbols may be used. Messages are not case sensitive; maximum length varies by message.	

Special rules apply when entering the characters listed below into the dialog message.

Desired Character for Message	What to Input	Notes
^X	<esc> <ctrl>X	Without the <esc> key, ^X will abort the message.
ESC (escape)	<esc><esc>	To include an escape key in the text, it must be preceded by an <esc>.
; (semicolon)	<esc>;	To include a semicolon in the text, it must be preceded by an <esc>.
(carriage return, line feed)	;	Inserts a carriage return, line feed which counts as two characters.

Note: There is one additional Dialog Message called Class Message, which does not appear on this menu (refer to page 5-9).

Administration 6

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Depending on your equipment, the functions discussed in this section may be accomplished via

- the dedicated command port
- a floating command port
- the NETMan Network Management product.

This section assumes you are using the floating command port. The first method requires that your unit be equipped with an optional NMS module. Refer to the NMS manual. For administration information using NETMan, refer to the NETMan User's Manual.

Reset

A reset is defined as a restart to a known point. During configuration a reset establishes the new point. To clear a channel, node or link that might be hung up, a reset may be necessary. Resets interrupt the normal flow of traffic, so choose the one which is the least invasive. For instance, to clear one channel, perform a channel reset, instead of a node reset which interrupts the whole network.

There are two ways to perform a node reset on the unit, through the Command Facility Main Menu (software reset) and from the front of the unit (hardware reset).

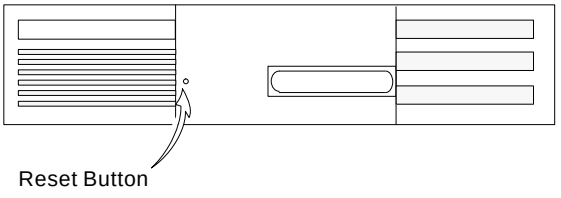
Notes:
- Performing a reset on a channel or a node terminates the Command Facility on that port if you entered via $CMD.
- Resetting the unit (cold or warm) resets the status/statistic counters. All previous statistics are lost.

Hardware Reset on Marathon Unit

The hardware reset is performed at the front of the unit. The actual procedure depends on which model you have.

Without LCD/Keypad

With a narrow or pointed object (such as a pen), carefully depress the recessed reset button and hold it for two seconds.



Keypad Reset

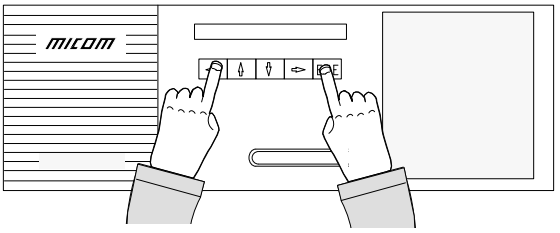
There are two types of node resets available from the keypad, a hardware reset (which does not require a password), and the reset performed from inside the menu functions software (refer to Menu Function Reset).

From the front of the unit, press the two outside keys (left arrow and EXEcute) at the same time as shown and hold for two seconds. The unit will go into self-test.

Note: Time and date are lost during a hardware reset, current configuration remains.

Simultaneously push both outside keys and hold for 2 seconds.

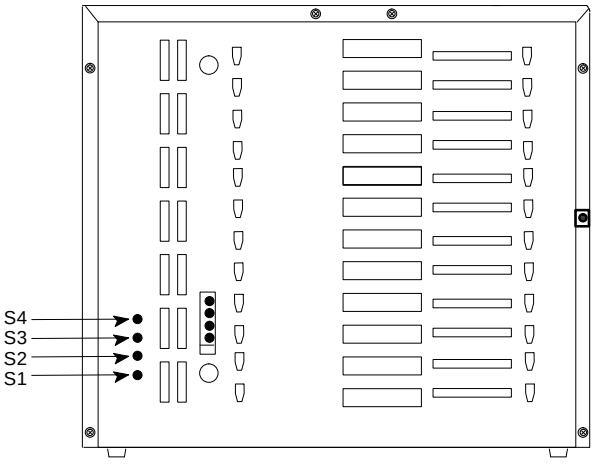
Backlight will momentarily extinguish



Hardware Reset on the STADIA Integration Hub

To access the hardware reset, open the cabinet door and select the appropriate reset switch for the desired CCM. For additional information, refer to the Integration Hub Installation Manual.

Press S1 for the CCM in slot 1, S2 for the next CCM and so forth. Hold the button for two seconds until the CCM resets.



Front View

Menu Function Reset (5-Slot Chassis only)

Within the LCD/keypad menus, in the Administration menu, there is a system (menu functions) reset which offers either default configuration (cold start) or current configuration (warm start). The warm start will not reset the time and date like the hardware reset.

To access either a cold or warm start within the LCD/keypad menus take the following path:

Banner Messag⇨ Menu
Functions
⇩
Administration
⇩
System
⇩
Clear Latched Alarms ⇨ System Reset[1] ⇨ Restart Link ⇨ Reset Channel
⇩
Default Configuration[2] ⇨ Current Configuration[3]

[1] If you push the right arrow again you will select the restart link option (push down arrow). Push EXEcute arrow again and you reset the channel (push arrow down).

[2] If you wish to cold start your Marathon unit and return it to the factory defaults, press the EXEcute key twice.

[3] If you wish to warm start your Marathon unit without changing the current configuration, press the EXEcute key twice.

Command Facility Reset

In the Command Facility, several types of software resets are available. To access the Reset menu, follow this path,

```
COMMAND FACILITY MAIN MENU
  [ ]  RESET
```

Units with dual-bank Flash memory

```
RESET
    1.  NODE
    2.  LINK
    3.  CHANNEL
    4.  INTEGRAL LAN
    5.  T1/E1[1]
    6.  NODE: BANK SELECTED SOFTWARE
```

Marathon 3K with single-bank Flash memory

```
RESET
    1.  NODE
    2.  LINK
    3.  CHANNEL
    4.  INTEGRAL LAN
    5.  NODE: FLASH RELOAD
```

All units with FEATUREPAK installed

```
RESET
    1.  NODE
    2.  LINK
    3.  CHANNEL
    4.  INTEGRAL LAN
    5.  T1/E1[1]
```

[1] Only displays on Marathon 5K Turbo or 20K.

The following options are available.

Option	Description
1. Node	For the local node only. All locally attached MICOM muxes will reset. Remote unit(s) and their MICOM muxes will not be reset by this option. Two options for node reset are factory *default values* (cold start), or *current configuration* (warm start). **Notes:** • If you are attempting to activate new software or a FlashPak, you must use the Node: Flash Reload option. This option uses the current version of software. • The T1/E1 Access Module will not reset with this option. You must select the T1/E1 option for that reset (Marathon 5K Turbo or 20K).
2. Link	Clears all information on the link and *will disconnect all ports* currently using the link being reset. *If a mux link*, it will reset the MICOM mux also. Force connected channels will automatically reestablish connection. Refer to Link Reset on page 6-5 for frame relay link information.

Option	Description
3. Channel	Disconnects and resets a *single data or voice/fax channel only* without disturbing the whole network.
4. Integral LAN	Resets the integral LAN module (RTS or Integration Router Module).
5. T1/E1	Resets the T1 or E1 Access Module on the Marathon 5K Turbo or 20K. All traffic on the T1 or E1 Access Module and associated Digital Voice Modules will be interrupted. The unit will not reset.
5 or 6.	
• Node: Bank Selected Software	If you have a dual-bank Flash memory installed and have proceeded through all the steps to download and select a bank, this option resets the node and loads the selected bank into RAM. This reset will take several minutes to complete.
• Node: Flash Reload	Marathon 2K and 3K with single bank Flash memory: Loads the software from the Flash bank into RAM. This reset will take several minutes to complete.

Reset Frame Relay Link

Follow this path to reset the frame relay link:

```
COMMAND FACILITY MAIN MENU
   [ ]  RESET
```

```
RESET
   [2]  LINK
```

```
ENTER NODE-ID/CHANNEL # (^X TO ABORT): A1
```

```
FRAME RELAY LINK RESET
    1.  RESET ACCESS LINK
    2.  RESET SPECIFIC DLCI
    3.  RESET ALL DLCI'S
```

Option	Description
1. Reset Access Link	Resets the physical interface and sets any new configuration made in the Frame Relay Link Parameters menu. **Important** If you change the clocking rate (external or internal) you must use this option to restart the link.
2. Reset Specific DLCI	Resets one of the DLCIs. This is the least invasive type of reset on the frame relay link as the other DLCIs are not interrupted, only the link selected.
3. Reset All DLCIs	Resets all the DLCI on the frame relay link.

Marathon 3K Save Feature

The Marathon 3K configuration must be *saved* to flash memory after every parameter change. This is accomplished either manually or automatically.

Manually

Select the *Save* option from the Command Facility Main Menu after each configuration change. This is the recommended method of saving.

While the configuration is being saved, the keyboard is locked out.

```
COMMAND FACILITY MAIN MENU

 12  SAVE CONFIGURATION
```

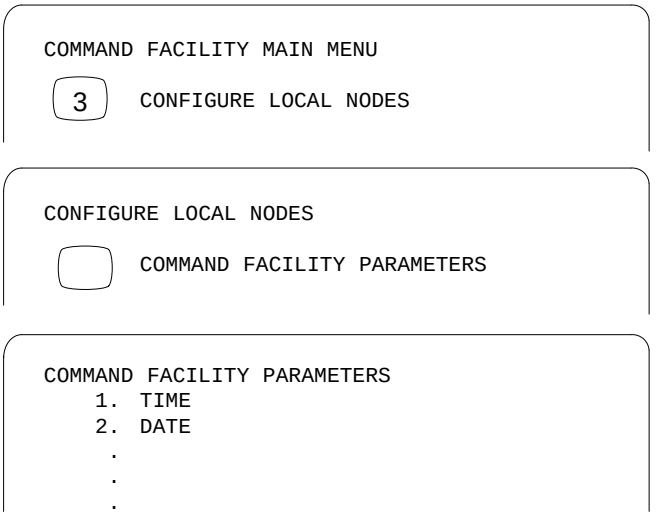
Automatically

- Periodically the unit will save if there have been changes to the configuration. If there are no changes, the configuration is not updated.
- After a *soft* node reset (reset node to *current configuration*) or if the unit resets (but power is not lost). This includes all node resets from Command Facility. The does not include a hardware reset performed from the front of the unit.
- If you *force connect* or *force disconnect* a port.

Configuring the Command Facility Parameters

Note: If your unit contains a real time clock, refer to page 2-10 for information on its configuration and operation.

This menu controls the node's parameters. (If an NMS module is installed[1], refer to the NMS Manual to configure the Command Port, Log Port and Modem Parameters.) To access this menu, follow this path,



Note: Not all options on this menu are available on Marathon 2K and 3K. The option numbers shown here may be different.

Option	Default	Description
1. Time	00:00:00	System time. At power up, the unit requests the time from locally attached MICOM muxes to insure that the network agrees on the time of day. If there are no local MICOM muxes, time starts at 00:00:00.
2. Date	00/00/00	System date in mm/dd (month/day/year). The month and day will reset to 00/00/00 if a hardware reset or *default value* node reset is performed and there is no real time clock in the network.
3. Event Reporting	Off	Toggles on or off. An event is a normal change of state in the system. No action is required. The events are reported to the location defined in the Output Event/Alarm Reports option.
4. Alarm Reporting	On	Toggles on or off. Alarms are messages about errors in the system which are vital to its performance. The alarms are reported to the location defined in the Output Event/Alarm Reports option.

[1] Not applicable to the Marathon 2K and 3K.

Option	Default	Description
5. Switch Statistics Reporting	On	Toggles on or off. Switch statistics are class number, name, number of connects, connect failures and maximum number in queue. This is part of the system statistics report.
6. Periodic Reporting Interval	60	Defines the interval of time for a periodic report.
7. Output Event/Alarm Reports	Local Command Port	Defines the output location as the local Command Port, the local log port (if the NMS module is installed)[1], remote node or an external modem. Only one of these locations can be selected.
8. Output Periodic Report	Local Command Port	Defines the output location as either the local Command Port, the local log port (if the NMS module is installed)[1], or the remote node. Only one of these locations can be selected. There is a 3-minute timeout on the remote node and local log port. If the report cannot be sent to the device within 3 minutes, it will be lost.
9. Remote Node ID	n/a	If option 7 or 8 define the output report location as the remote node, the remote node ID is defined here. If both options are configured to a local output, there is no need to configure a remote node ID.
10. External Modem Priority[1]	High	If option 7 defines an external modem, this defines whether event/alarm reports are immediately output or buffered and output when the queue is 70% full.
11. External Modem Phone #[1]	n/a	If option 7 defines an external modem, this sets the telephone number.
12. External Alarm Relay[1]	Disable	Controls whether the external alarm relay on the NMS module is activated. **Note**: Be sure that option 4 is turned *on* for alarms to be enabled.
13. No Activity Timeout	15	Monitors the Command Facility port. After a specified period of time, if no activity is detected on the channel, it will be disconnected. The time out is programmable for 1–60 minutes; 0 = none.
14. LCD Banner Message[1]	n/a	Displays on the top line of the LCD panel.
15. Day of the Week	n/a	This sets the day of the week.

[1] Not applicable to the Marathon 2K and 3K.

Alarm Messages

Alarms generally indicate that an error has been detected that impacts or degrades performance of part of the network. Examples of alarm messages include notification of excessive line error rates or link loss. The output of alarm messages can be configured via the Output Event/Alarm Reports menu (an option of the Command Facility Parameters menu). Note that the alarms must be *enabled* via the Alarm Reporting option of the Command Facility Parameters menu.

For a list and description of all the alarms, refer to Appendix C, Messages.

To clear an alarm, select the Clear Alarm Displays option of the Command Facility Main Menu.

Event Messages

Event messages are reported in real-time and indicate changes in the network that do not impact the overall performance of the network. Examples of events include ports that are connecting or disconnecting from the network and non-fatal errors in the network. The output of event messages can be configured via the Output Event/Alarm Reports option of the Command Facility Parameters menu. Note that the events must be *enabled* via the Event Reporting option of the Command Facility Parameters menu.

For a list and description of all the alarms, refer to Appendix C, Messages.

Network Security

Protecting selected portions of the Command Facility (and Command Mode) involves two types of security: password protection and lock-out configuration. These are discussed in the following paragraphs.

Passwords

Passwords are security protection for the unit. There are four types of password protection which may be assigned to the unit: Command Facility, Channel, Class and $DLD (Code Download facility).

Password Syntax	Valid global and status passwords must be alphanumeric characters with a maximum length of eight characters.
Null Passwords	By factory default, all passwords are null (no passwords). If a password had previously been configured and is no longer required, enter a space at the password prompt, then Enter. This configures a null (no) password.

Channel Passwords are configured in the Async Channel Switching Parameters menu (an option of the Async Channel menu, refer to page 5-11). Class passwords are configured in the Class Parameters menu (refer to page 5-10). Channel and Class passwords can be displayed at the Command Facility. The $DLD Password is configured in the Download Parameters Menu (Refer to page 6-17). Command Facility and $DLD passwords cannot be displayed.

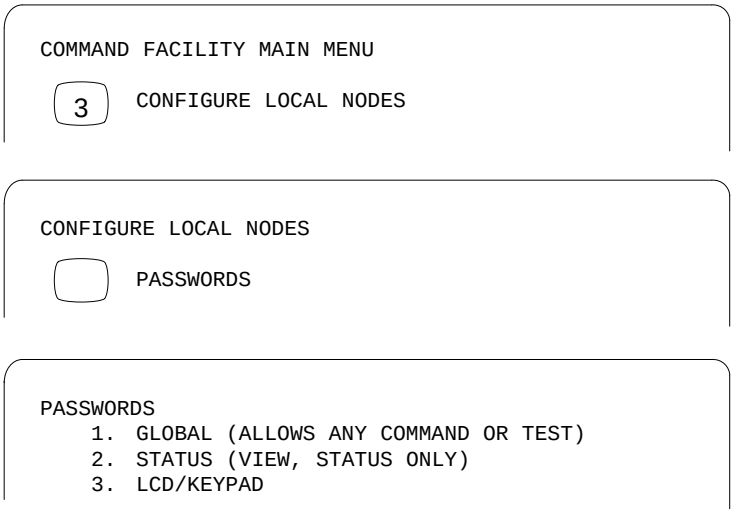
Command Facility Password Configuration

The Command Facility passwords provide different types of security for access to the Command Facility.

Global password:	Allows access to all functions.
Status password:	Allows access only to the view, status, and exit functions.
LCD/Keypad password: (all models except Marathon 2K and 3K)	Allows access to all LCD/Keypad functions. This may be a series of up to eight *up* (U), *down* (D), *left* (L), *right* (R) arrows. This password sequence is entered in the Command Facility as the U, D, L, R characters followed by Enter.

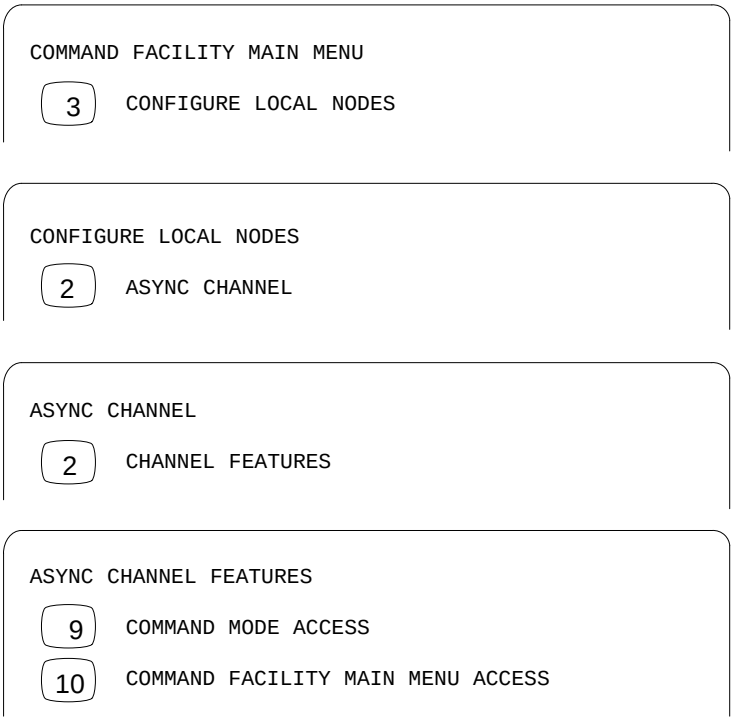
CAUTION

Record these passwords. If they are forgotten, a cold start is required. Reinstate the system defaults and clear the user-defined passwords.



Lock-Out Configuration

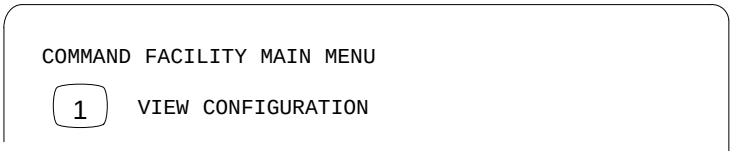
This type of security blocks the async user's access to the Command Facility, the Command Mode, or both.



To enter the Command Mode, but not the Command Facility, *enable* the Command Mode Access and *disable* the Command Facility Main Menu Access. If you will be entering the Command Facility via the Command Mode, be sure both are *enable*d (default).

View Configuration

View configuration is a display of the existing configuration. It is occasionally helpful to verify changes in configuration and information gathering during troubleshooting. No changes to the configuration can be effected through these menus. To alter the configuration, refer to the appropriate configuration section.



Depending on your model, option numbers may vary. The following options are available:

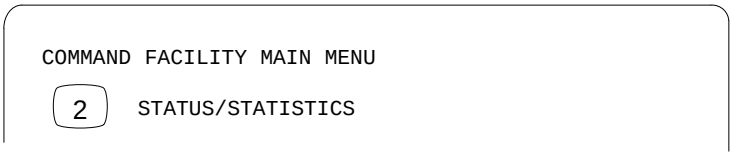
Option	Description
1. Async Channels	Displays a range of async ports.
2. Sync Channels	Displays a range of sync ports.
3. Voice/Fax Channels	Displays a range of voice/fax ports.
4. Classes	Displays the class parameters as currently configured.
5. Class Messages	Displays the current class messages for all the configured classes.
6. Dialog Messages	Displays all of the dialog messages.
7. Hardware	Displays the installed modules, their model number and revision level.
8. External Modem Phone #[1]	Displays the telephone number used by an external modem to output events and alarms (if an external modem is configured).

Options 1-6 will display the configuration of the local unit and local MICOM mux. Options 7, and 8 will display the local unit's configuration only. To view the remote Marathon unit(s) and remote MICOM mux configurations, connect to the remote Command Facility via Configure/View Remote Node (from the Command Facility Main Menu).

[1] Not on Marathon 3K. Not applicable to Marathon 2K.

Status/Statistics

Status is a snapshot of the system as it appears the moment the request is made; statistics are a readout of the system within a defined period of time.



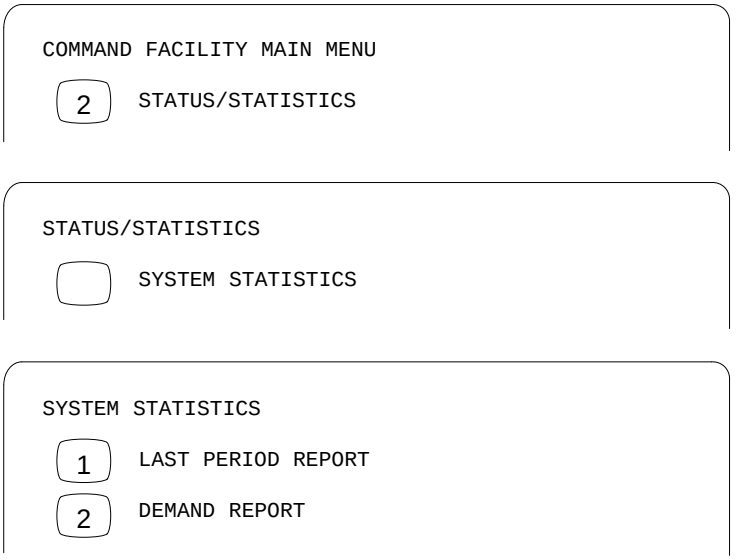
Depending on your model, option numbers may vary. The following options are available:

Option	Description
1. Node Status	Displays the current node IDs, node numbers, port and link type, link status and speed for nodes connected directly to the local unit. It also lists all available nodes in the network.
2. Channel Status	Displays the current voice/fax and data channel status of a range of ports, the speed, and the node ID/channel number of any connection.
3. Interface Status	Displays the current interface state of the control signals for the selected port (local unit only).
4. Queue Status	Lists all the class numbers, names and the node ID/channel number of the ports queued to each class. This will display up to 30 ports per class.
5. Voice/Fax Status	Displays a range of ports selected, the input level, the mode (on hook, off hook, busy), the software revision, and if applicable, the test mode, test status, and Flash status.
6. System Statistics	Provides two options, the period report (the report compiled during the last reporting period) or a demand report (statistics since the last report). Refer to System Statistics Reports on page 6-14 for additional information.
7. Channel Statistics	Displays the current channel statistics for the node selected. Displayed are percentage of buffer utilization, busyout and flow control status. Integral devices are not displayed with this menu.
8. Switch Statistics	Displays by class number, name, number of connects, connect failures and maximum number of ports in queue.

Option	Description
9. PROM ID	Displays the PROM set number of the FEATUREPAK or FlashPak cartridge. The last character in the number reflects the revision level. On units utilizing Flash memory (FlashPak or on-board), this option displays the status of each bank and the boot code.
10. Voice/Fax Daily Statistics	Displays current statistics accumulated since midnight.
11. NETMan Status	Displays a current status of the optional network management system (if installed).

System Statistics Reports

There are two types of reports, a demand report (a snapshot of the system at the time of request) or a period report (information based on a configured period of time). These reports can be output regularly to a configured destination (local command port, log port, or remote node). Both reports appear in the same screen format.

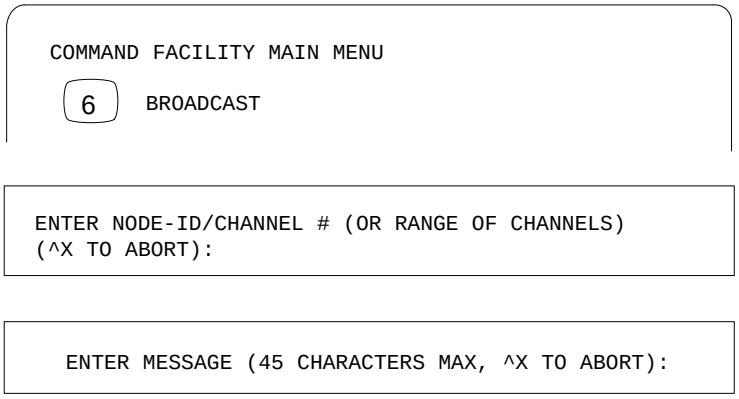


Information on configuring the periodic interval can be found on page 6-8. Samples of reports can be found in the Command Facility Reference Guide.

Broadcast

Broadcasting allows the system administrator to send a message to an async port or a range of async ports on the network.

To broadcast, follow this path:


COMMAND FACILITY MAIN MENU
6
BROADCAST
ENTER NODE-ID/CHANNEL # (OR RANGE OF CHANNELS)
(^X TO ABORT):
ENTER MESSAGE (45 CHARACTERS MAX, ^X TO ABORT):

If there is a non-async port in the range selected, `OUT OF RANGE` will display.

Enter a message consisting of no more than 45 characters including spaces and punctuation. Special rules apply when entering the characters shown in Table 6-1 into the broadcast message.

Table 6-1. Special Broadcast Characters

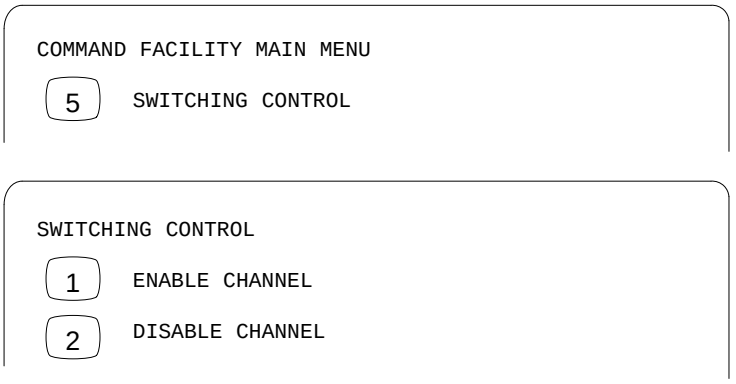
Desired Character for Message	What to Input	Notes
^X	<esc> <ctrl>X	Without the <esc> key, ^X will abort the message.
ESC (escape)	<esc><esc>	To include an escape key in the text, it must be preceded by an <esc>.
; (semicolon)	<esc>;	To include a semicolon in the text, it must be preceded by an <esc>.
(carriage return, line feed)	;	Inserts a carriage return, line feed which counts as two characters.

Channel Administration

Occasionally a data or voice/fax port must be removed from service, reset, reconfigured, or returned to service. For instance, a port may need to be removed from service so that periodic maintenance may be done on the attached device.

To reset a channel, refer to page 6-4.

Disable or Enable a Channel



Option	Description
1. Disable Channel	Takes an async data or voice/fax port out-of-service.
2. Enable Channel	Places the async data or voice/fax port back into service.

Options 3 and 4 of this menu do not apply to this application.

Determining What Hardware You Have

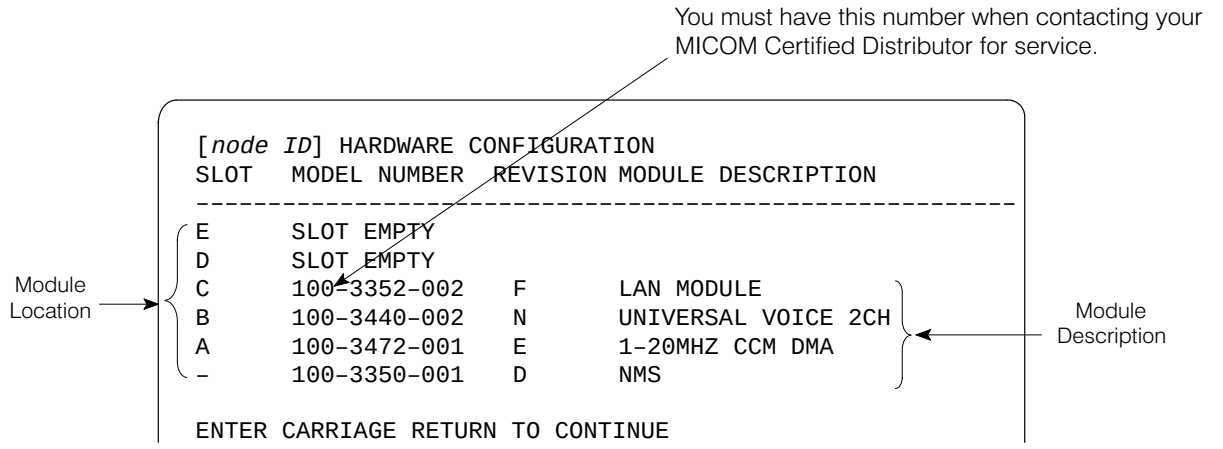
Follow this path when you need to determine the exact information on your hardware.

```
COMMAND FACILITY MAIN MENU [node ID]

 1   VIEW CONFIGURATION
```

```
VIEW CONFIGURATION [node ID]

     HARDWARE
```

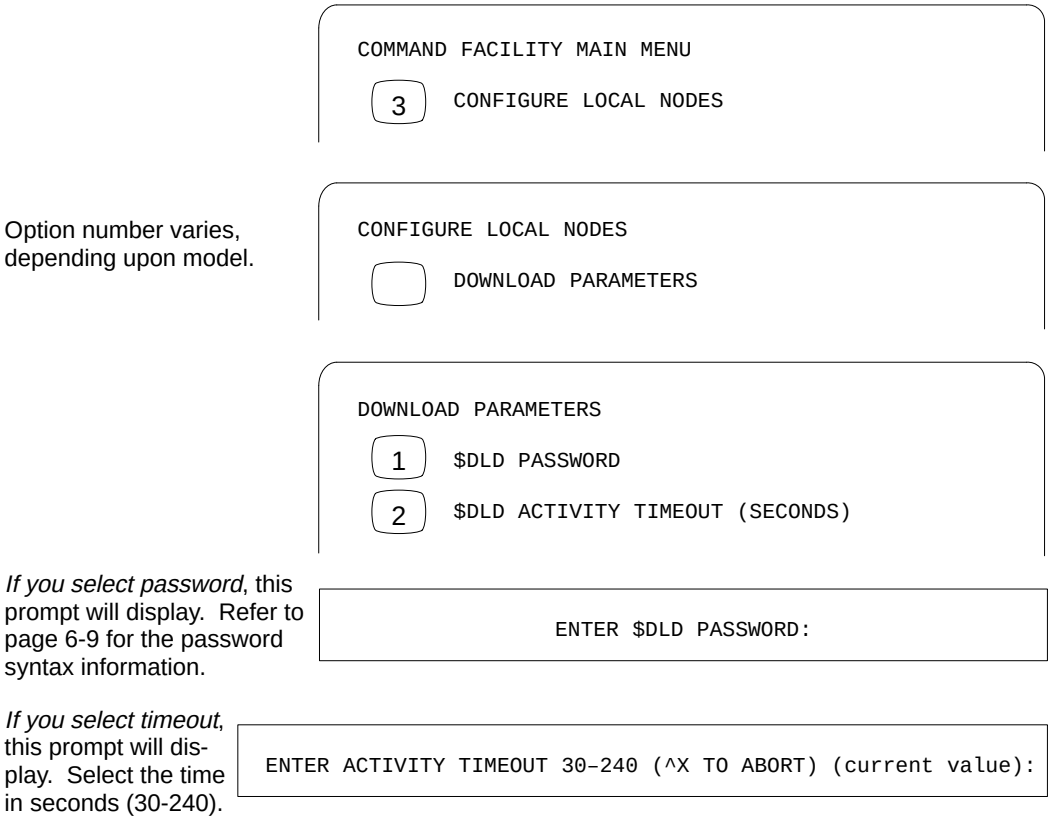

You must have this number when contacting your MICOM Certified Distributor for service.
[node ID] HARDWARE CONFIGURATION
SLOT MODEL NUMBER REVISION MODULE DESCRIPTION
E SLOT EMPTY
D SLOT EMPTY
C 100-3352-002 F LAN MODULE
B 100-3440-002 N UNIVERSAL VOICE 2CH
A 100-3472-001 E 1-20MHZ CCM DMA
- 100-3350-001 D NMS
ENTER CARRIAGE RETURN TO CONTINUE
Module Location
Module Description

Downloading Code

If your unit is equipped with a FlashPak cartridge or if it contains internal flash memory, you may download new software (code) to your unit. Also, your voice module (Release 4.0 and later), Integration Router Module (LAN IRM Release 6.0 and later), the T1/E1 Access Module (Release 4.3 and later) and Digital Voice Module (Release 4.3 and later) are code downloadable. The complete procedures for downloading code are found in the Code Download User's Manual (Part No. 800-1844).

$DLD Facility

The $DLD download facility interfaces between the Marathon unit and the device actually performing the code download (PC or NETMan). To protect against unauthorized access to this facility, you may set a password. There is a timer associated with the facility ($DLD Activity Timeout); if there is no activity in the facility during the specified time, it will disconnect. The default for this timeout is 120 seconds. To set a password or establish a timeout period other than the default, use the following path:



Option number varies, depending upon model.

If you select password, this prompt will display. Refer to page 6-9 for the password syntax information.

If you select timeout, this prompt will display. Select the time in seconds (30-240).

Activating Downloaded Code

In the dual bank internal Flash memory or FlashPak, you may select which bank to activate (load into RAM); this is assuming that both banks contain code. It is likely that you will want to use the most recent version. Use the following path for activating the most recent code.

Note: This procedure is only for FlashPak and units with dual-bank memory.

Access the Download Parameters menu.

```
COMMAND FACILITY MAIN MENU
  3   CONFIGURE LOCAL NOES
```

Option number may vary, depending upon model.

```
CONFIGURE LOCAL NODES
      DOWNLOAD PARAMETERS
```

```
DOWNLOAD PARAMETERS
      CCM BANK TO ACTIVATE WITH RESET
```

Select the bank to activate.

```
CCM BANK TO ACTIVATE WITH RESET
  3   MOST RECENT
```

Return to Main Menu.

```
DOWNLOAD PARAMETERS

ENTRY: M
```

Reset the unit.

```
COMMAND FACILITY MAIN MENU
  10  RESET
```

Option numbers may vary.

```
RESET
      NODE: BANK SELECTED SOFTWARE
```

Note: If you elect to load a previous version of software, you will have to reset your unit to the factory default.

7 Diagnostics

Contents

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Terminate Test 7-2
Async Channel Loopback in the Command Mode 7-2
System Diagnostics 7-4
LED Test 7-5
Async Channel Output 7-5
Sync Channel Loopback 7-6
Link Channel Loopback 7-7
Remote Composite Loopback 7-7
Testing the Network 7-8

Diagnostics are tools by which the system administrator or the operator can ascertain and isolate possible problems. Diagnostic tests can be performed through the Command Facility or the keypad on the front of the Marathon unit. A complete discussion of the Diagnostic menu on the LCD/Keypad on 5-slot units (other than Marathon 2K *Plus*) is provided in the LCD/Keypad Manual.

Note:
- Composite loopback tests may not be performed by tail-ending channels.
- Frame relay links do not support diagnostics.

Self-test

The self-test checks the operation of all system memory. The unit executes a self-test at system initialization and any time the system is reset. When power is first turned on or the system is reset, the system momentarily turns all indicators *on*. The unit will do a RAM and ROM check. The port indicators stay *on* until the completion of the self-test. Appendix D lists and explains the indicator lights for the CCM and CEM.

Terminate Test

Some tests require a termination command.

```
COMMAND FACILITY MAIN MENU

 8   TERMINATE COMPOSITE LOOPBACK AND INTEGRAL TESTS
```

Async Channel Loopback in the Command Mode

Async Channel Loopback tests are designed for the users to test their own terminals. To access the Command Mode, refer to page 2-4. To access the menu, use the following path:

```
        1996 MICOM COMMUNICATIONS CORP.
              ALL RIGHTS RESERVED
      UNPUBLISHED – RIGHTS RESERVED UNDER THE
        COPYRIGHT LAWS OF THE UNITED STATES


       COMMAND MODE: CHANNEL [B1]

        1    ASYNC CHANNEL LOOPBACK
```

```
      ASYNC CHANNEL LOOPBACK
          1.  LOCAL ECHO
          2.  REMOTE ECHO
          3.  LOCAL FOX
          4.  REMOTE FOX
```

Option	Description
1. Local Echo	Places the local channel in loopback. The unit loops back all data to the terminal (Figure 7-1).
2. Remote[1] Echo	Link must be operational. Data is looped through the remote unit to the local terminal that initiated the test (Figure 7-2).
3. Local Fox	Causes the local node to output a fox message to the selected local port (Figure 7-1).
4. Remote[1] Fox	Link must be operational. Local node sends a fox message to the remote node, which is then looped back to the port (Figure 7-2).

- The integrity of the components involved in the test may be judged by observing the quality of the returned data.
- These are the same tests as are available in Link Channel Loopback except that when attempting a remote echo or fox, a port connection must be made at the remote node.
- If a remote test (either echo or fox) is requested and the terminal is not connected to a remote port, the following will display:

```
NO REMOTE CONNECT ACTIVE.
```

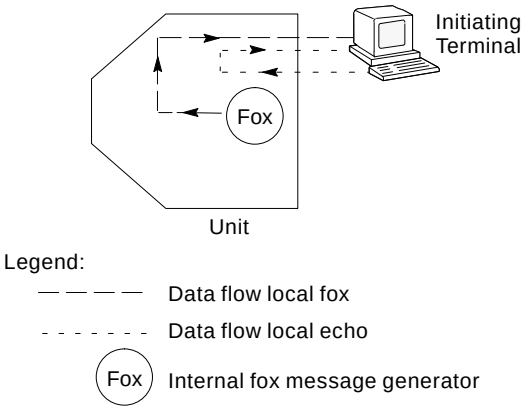
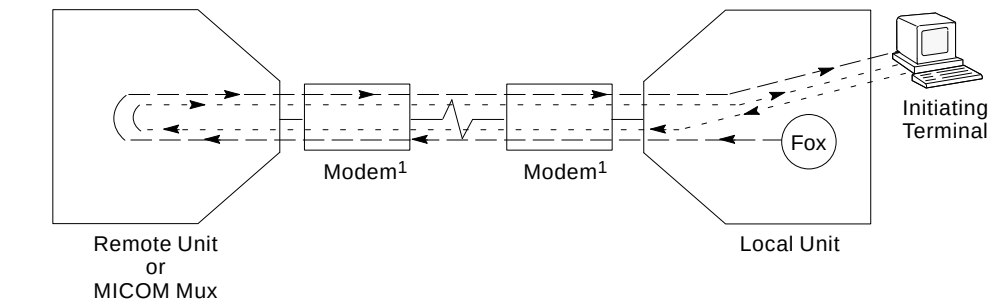


Figure 7-1. Local Channel Loopback

[1] The remote end can be either another Integration unit or a MICOM mux. The port must have a connection established to a remote port.



Legend:

——— Data flow remote fox

- - - - - - Data flow remote echo

(Fox) Internal fox message generator

[1] External modem, integral modem module, or ISU module

Figure 7-2. Remote Channel Loopback

System Diagnostics

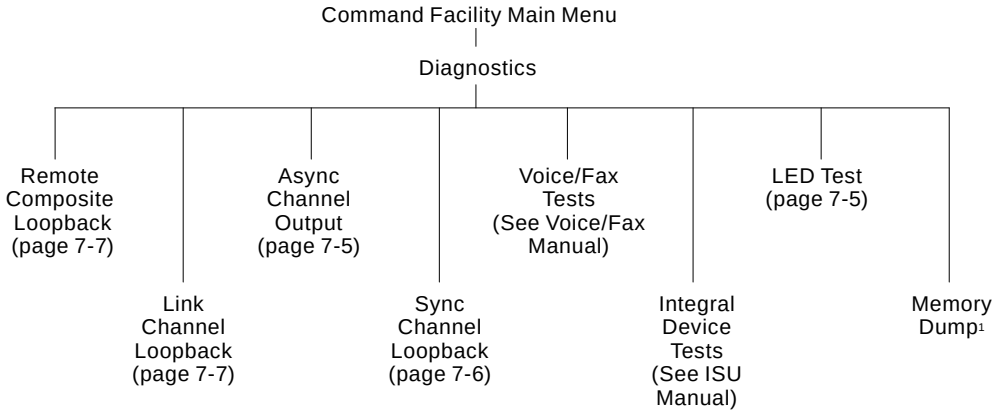
Access the Diagnostic menu from the Command Facility Main Menu:

```
COMMAND FACILITY MAIN MENU

 7   DIAGNOSTIC
```

```
DIAGNOSTICS
    1.  REMOTE COMPOSITE LOOPBACK
    2.  LINK CHANNEL LOOPBACK
    3.  ASYNC CHANNEL OUTPUT
    4.  SYNC CHANNEL LOOPBACK
    5.  VOICE/FAX TESTS
    6.  INTEGRAL DEVICE TESTS
    7.  LED TEST
    8.  MEMORY DUMP
```

The system administrator may perform all of the following diagnostics from the Command Facility. Figure 7-3 shows the options available.


Command Facility Main Menu
Diagnostics
Remote Composite Loopback (page 7-7)
Link Channel Loopback (page 7-7)
Async Channel Output (page 7-5)
Sync Channel Loopback (page 7-6)
Voice/Fax Tests (See Voice/Fax Manual)
Integral Device Tests (See ISU Manual)
LED Test (page 7-5)
Memory Dump1

1 Reserved for MICOM use.

Figure 7-3. Diagnostic Menu Block Diagram

LED Test

This test causes all of the LED indicators to light simultaneously for a couple of seconds and then extinguish. This verifies that the indicator lights to be sure they are working. This test automatically terminates after five seconds.

Async Channel Output

This option permits the Command Facility terminal to place an async port into a test mode within the local hub group. This option is useful for testing unattended terminals or devices that do not have a keyboard, such as printers. There are two channel output tests available:

- Fox Message Test – continuous fox message is output to the test port.
- Input Test – sends data input from the Command Facility terminal to the port to be tested (Figure 7-4).

Note: While under test, this port may be called or force connected via the Command Facility. Nothing will occur while the port is being tested (even though the calling side receives the CONNECTED message). The port will be connected when the test is terminated.

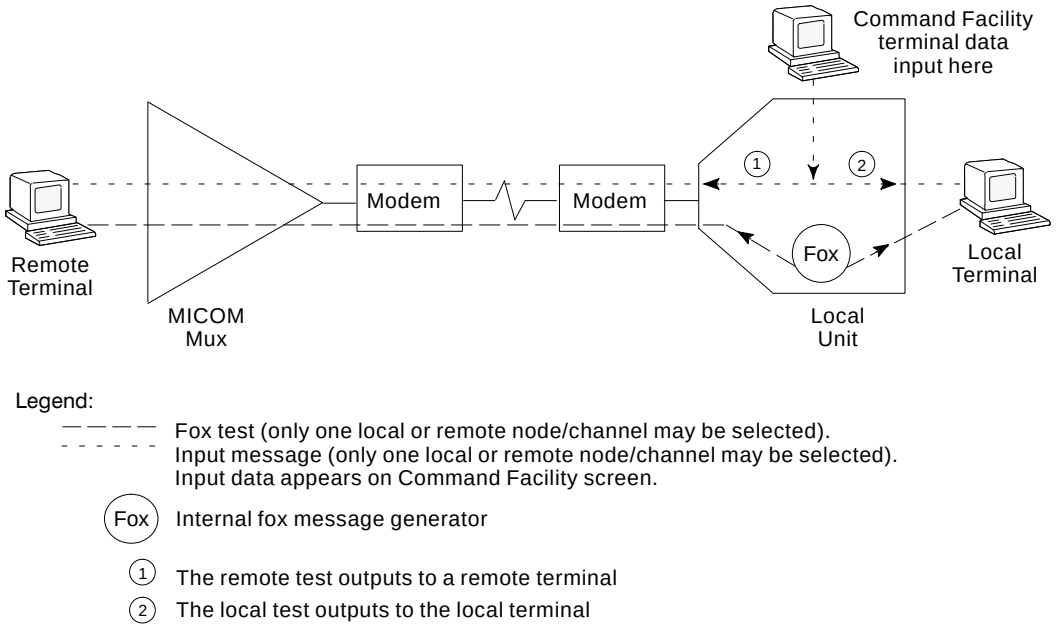


Figure 7-4. Async Channel Output

Sync Channel Loopback

This test causes a sync channel to be placed in local echo loopback (Figure 7-5). Characters entered from the attached device will be echoed back to the device. The sync port must be force connected to another sync port for the test to operate.

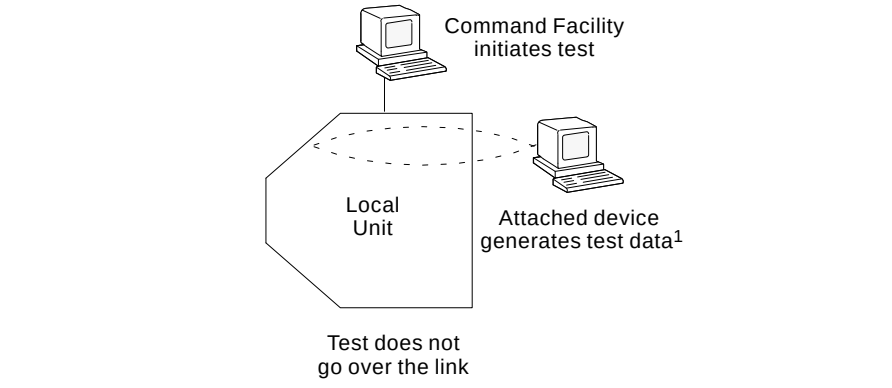


Figure 7-5. Sync Channel Loopback

Link Channel Loopback

These tests are performed on async ports from a user's terminal. The menu is the same as the Async Channel Loopback in Command Mode (page 7-2).

1. Local Echo
2. Remote[1] Echo
3. Local Fox
4. Remote[1] Fox

Notes:
- For remote tests (either echo or fox), the terminal does not require connection to a remote port (unlike the remote tests for the Async Channel Loopback in the Command Mode).
- On frame relay link, the remote options do not apply.

Remote Composite Loopback

The Remote Composite Loopback sets up the local unit to expect its own data back (for example, from a telco). This is used in conjunction with tests initiated by a standalone or remote modem/ISU or telco. When initiated, this test interrupts all user data; if enabled on a MICOM mux, all MICOM mux ports are put out-of-service.

During the test the link indicator light on the local unit will be *on*.

Note: If the link you are testing has an associated link (secondary or primary), the secondary link may activate. It is recommended that before activating a remote composite loopback (on either the primary or secondary link), the secondary link should either be forced connected or the attached devices (on the secondary) be turned off.

[1] The remote can be either another Integration unit or a MICOM mux. Be sure to set the local or remote unit to *Remote Composite Loopback* so it will accept the data regardless of its condition.

Testing The Network

In an Integration network, there are several loopback and test pattern tests which you can use to diagnose the integrity of various *segments* of the network. Some optional modules contain their own diagnostic tests; detailed information on those tests are found in the individual module manuals. The following information is important to note when attempting to invoke a diagnostic loop for async data channels with

- integral device ISU),
- standalone DSU/CSU and modems,
- telco loops,
- link remote loops.

Testing connected async port (no integral devices)

1. Log into the Command Mode and access the Async Channel Loopback test.
2. You may do either one of the following setups:

a. Select a remote echo test.

- Attach an async tester (i.e., a BERT) to the async port initiating the test.

or

- Type in some data. All data entered should be received on your display.

or

b. Select the remote fox (option 4). The message is automatically sent. It should be received and displayed.

Testing an async port (*not connected, no integral devices looped*)

1. Log into the Command Facility Main Menu, Diagnostics. Select Link Channel Loopback. You will be prompted for the link.
2. You may do either one of the following setups:

a. Select the remote echo.

- Attach an async tester (i.e., a BERT) to the async port initiating the test.

or

- Type in some data. All data entered should be received on your display.

or

b. Select the remote fox. The message is automatically sent. It should be received and displayed.

Local loop conditions for testing integral devices (ISU)

(*async channel is **not** force connected*)

Note: This test will interrupt normal operation over the link.

1. Log into the Command Facility Main Menu, Diagnostics. Select Integral Device (option 6) and desired loopback.
2. At the Diagnostics menu, select Link Channel Loopback and the module location/channel number of the integral device.
3. You may do either one of the following setups:

a. Select remote echo.

- Attach an async tester (i.e., a BERT) to the async port initiating the test.

or

- Type in some data. All data entered should be received on your display.

or

b. Select the remote fox. The message is automatically sent. It should be received and displayed.

Testing telco and remote integral devices *(Async channel is **not** force connected)*

Notes:
- This test will interrupt normal operation over the selected link.
- The test requires operator intervention at the remote unit.

At the remote unit,

Put the remote unit into a digital loopback test.

At the local unit,

1. Log into the Command Facility Main Menu, Diagnostics. Select Remote Composite Loopback. Enter the channel number of the link.
2. At the Diagnostics menu, select Link Channel Loopback. You may do either one of the following setups:

a. Select remote echo.

- Attach an async tester (i.e., a BERT) to the async port initiating the test.

or

- Type in some data. All data entered should be received on your display.

or

b. Select the remote fox. The message is automatically sent. It should be received and displayed.

Testing standalone modem and DSU/CSU

Notes:
- This test will interrupt normal operation over the selected link.
- The test requires operator intervention at the remote unit.

1. Log into the Command Facility Main Menu, Diagnostics. Select Remote Composite Loopback. Enter the channel number of the link.
2. At the Diagnostics menu, select Link Channel Loopback. You may do either one of the following setups:
   a. Select remote echo.
      - Attach an async tester (i.e., a BERT) to the async port initiating the test.

        or

      - Type in some data. All data entered should be received on your display.

        or

   b. Select the remote fox. The message is automatically sent. It should be received and displayed.

Specifications and Defaults A

These specifications are per Marathon unit or a single CCM and associated modules in an Integration Hub. On page A-3 there are specifications for the complete Integration Hub.

Functional Specifications

	2K, 2K *Plus*	3K	5K Turbo	10K	20K
Interconnect Link	0-1	0-1	0-3	0-12	0-12
Data Rates (in Kbps[1])	Up to 64	Up to 128	Up to 128	Up to 128	Up to 128
Secondary Link	0-1	0-1	0-2	0-6	0-6
Data Rates (in Kbps[1])	Up to 64	Up to 128	Up to 128	Up to 128	Up to 128
Local Interconnect Link	n/a	n/a	0-2	0-4[2]	0-5[2]
Data Rates (in Kbps[1])	n/a	n/a	64-256	64-256	64-256
Mux Link	0-1	n/a	0-5	0-5	0-5
Data Rates (All links)	Up to 19.2 Kbps[1]				
Frame Relay Access Links	0-2	0-2	0-4	0-6	0-6
Maximum Number of Configurable DLCIs	32	48	64	96	128
CIRs	User determined				
Frame Size	Up to 8189 octets of information per frame (including frame header). Does not include CRC.				
Voice	80% of CIR				
Trunk Clocking rates	56 Kbps – T1				
Voice Channels					
Analog	0-4	1-4	0-8	0-8	0-8
Digital	n/a	n/a	0-30	n/a	0-30

[1] Full duplex.
[2] With full termination, it is recommended to configure a maximum of two local interconnect links.

Status Displays	System status and port activity indicator lights.
Command Facility	Menu driven. Provides message broadcast, dynamic channel configuration, centralized troubleshooting, alarm messages, and periodic reports.
Diagnostics	Local channel tests, local and remote composite loopback tests, data output test, integral modem module tests, ISU module tests, voice/fax module tests and control signal monitoring.
Multiplexing Technique	*MicroBand* ATM — dynamically combines voice, fax, async, sync and LAN data onto one communications link.
Transparency	Normally transparent to ASCII user data. However, a port configured as *terminal* is transparent only when the data link is operational. The terminal port transmits *link down* in response to **^X** when the link is not operational. A port configured as *host* is always transparent to **^X**. Command Facility functions are activated by a **^X <break>** or **^X^Y** sequence. Transparency to these sequences is obtained by disabling the Command Mode using the Channel Features menu.

Asynchronous Channel Specifications

Capacity	**2K**	**3K**	**All other models**
	0-29	0-26	0-41
Speed	50-38,400 bps		
ABR	to 19.2 Kbps		
Parity	Odd, Even, Mark, Space, None		
Stop Bits	1, 1.5, 2		
Characters	5-8 bits/character plus parity (code levels 5 through 9)		
Classes	64		
Delay Characteristics	Async: 40 msec depending upon channel and composite speed Sync: 30-40 msec @ 9600 baud Satellite operation will affect delay time		

All ports present themselves as DCE.

Synchronous Channel Specifications

	2K, 2K *Plus*	3K	5K Turbo	10K	20K
Capacity (@ 9600 bps)	0-1	0-2	0-12	0-14	0-18

Clock Rate and Protocols	2K, 2K *Plus*	3K, 5K Turbo, 10K and 20K
ASCII Bisync, EBCDIC Bisync, H-P Sync	1200-19,200	1200-19,200
MICOM DLC, RTS/CTS, Sync-Pad	1200-19,200	1200-48,000
DLC	1200-19,200	1200-64,000
MICOM Voice	9600-14,400	9600-14,400
Fast Packet	1200-38,400	1200-64,000
TDM	1200-38,400	1200-64,000

All ports present themselves as DCE.

STADIA Integration Hub

Async Ports	153
Voice Ports	18
Sync Ports	54
Interconnect Link Ports	42
Secondary Links	21
Channel Termination	1,024 Mbps
Switching Aggregate	1,568 Mbps

Defaults

The factory defaults are presented in the following tables.

Table A-1. Async Channel Configuration

Async Channel Characteristics	
Menu Item	**Default**
Data Rate	9600
Code Level	8
Parity	None[1] Odd[2]
Stop Bits	1
Echo	Off
Channel End to Host/to Terminal	Terminal
XON Character	DC1
XOFF Character	DC3
Buffer Control	XON/XOFF
Flow Control	XON/XOFF
CR Delay	0
LF Delay	0
FF Delay	0
Async Channel Features	
Priority	High
EIA Control	Enable
Smooth Scroll	Off
Tandem	No
Flow Control Strip	Pass
HP ENQ/ACK	No
Sync Loss Disconnect	No
Command Mode Entry Sequence	^X Break
Command Mode Access	Enable
Command Facility Main Menu Access	Enable
Local Channel Configuration	Enable

[1] If Code Level = 5-8
[2] If Code Level = 9

Table A-1. Async Channel Configuration (cont'd)

Async Channel Features	
Menu Item	**Default**
Async Channel Extended Features	
Data Compression	Enable
Remote CTS Control	Forced On
Async Channel Switching Parameters	
Connect Protocol	Dedicated
Unbalanced Rates	On
Call Inhibit	No
Receive Inhibit	No
Character Set	ASCII
Matrix Switching	Enable

Table A-2. Unit Parameters

Command Facility Parameters	
Menu Item	**Default**
Event Reporting	Off
Alarm Reporting	On
Switch Statistics Reporting	On
Periodic Reporting Interval	60 (Minutes)
Output Event/Alarm Reports	Local Command Port
Output Periodic Reports	Local Command Port
External Modem Priority	High
External Alarm Relay	Disable
No Activity Timeout	15 (Minutes)
Passwords	None (NULL Passwords)
Mesh	Off
Download Parameters	
$DLD Activity Timeout (seconds)	120 (Seconds)
CCM Bank to Activate with reset	Most Recent

Table A-2. Unit Parameters (cont'd)

Dialog Messages

Menu Item	Default
Channel Password	ENTER PASSWORD:
Welcome	None
Class Request	ENTER CLASS:
Class Password	ENTER CLASS PASSWORD
Connected	CONNECTED
Queue	WAITING Q =
Busy	BUSY
Disconnected	DISCONNECTED
No Answer	NO ANSWER
Unavailable	UNAVAILABLE
Unassigned	UNASSIGNED
Incompatible	INCOMPATIBLE
Call in Progress	CALL IN PROGRESS

Marathon and MICOM Mux Default Node Numbers and IDs

Unit	Default Node Number[1]	Default Node ID[1]
Marathon Unit	240[1]	!240
MICOM Mux Connected To Port[2]		
• A1	241	!241
• A2	242	!242
• A3	243	!243
• A4	244	!244
• A5	245	!245

[1] If an NMS Module is installed, the node number and name may be programmed by switches. Refer to NMS Manual. Not applicable to any 3-slot chassis model.
[2] Not applicable to the Marathon 3K.

Table A-3. Port Configuration

Menu Item	Default
Port A1	Interconnect Link
Port A2, and above	Async
Set Link Rate for Interconnect, Frame Relay Local Interconnect & Mux Links	Sync External Clocks

Table A-4. Sync Channel Characteristics

Menu Item	Default
Sync Protocol	DLC
DLC Protocol	
Data Rate	2400
Channel Clocking	Tx-Internal/Rx-Internal
Maximum Transmit Block Size	512
Maximum Receive Block Size	512
Interface Type	To DTE
Carrier Mode	Constant
Encoding	NRZ
Idle Fill	Flag Fill
Buffer Control	None
Clock Flow Control	Enable
DSR Control	Normal
Priority	Low
Claimed Bandwidth	0
Transit Rate	Channel Rate
ASCII Bisync, EBCDIC Bisync	
Data Rate	2400
Channel Clocking	Tx-Internal/Rx-Internal
Maximum Transmit Block Size	512
Maximum Receive Block Size	512
Interface Type	To DTE
Carrier Mode	Constant
Sync Character	*
Number of Leading Syncs	3
PAD Character	FF (hexadecimal)
Number of Leading Pad Characters	1
Number of Trailing Pad Characters	2
Buffer Control	None
Clock Flow Control	Enable
DSR Control	Normal
Priority	Low
Claimed Bandwidth	0

* ASCII = 16
EBCDIC Bisync = 32

Table A-4. Sync Channel)Characteristics (continued

Menu Item	Default
RTS/CTS	
Data Rate	2400
Channel Clocking	Tx-Internal/Rx-Internal
Maximum Transmit Block Size	512
Maximum Receive Block Size	512
Interface Type	To DTE
Carrier Mode	Variable
Sync Character	FF
Number of Leading Syncs	3
Pad Character	FF (hexadecimal)
Number of Leading Pad Characters	3
Number of Trailing Pad Characters	3
Buffer Control	None
Clock Flow Control	Enable
DSR Control	Normal
Priority	Low
Claimed Bandwidth	0
Sync-Pad	
Data Rate	2400
Channel Clocking	Tx-Internal/Rx-Internal
Maximum Transmit Block Size	512
Maximum Receive Block Size	512
Interface Type	To DTE
Carrier Mode	Constant
Sync Character 1	16
Sync Character 2	16
Number of Leading Syncs	3
Pad Character	FF (hexadecimal)
Number of Leading Pad Characters	1
Number of Trailing Pad Characters	2
Buffer Control	None
Clock Flow Control	Enable
DSR Control	Normal
Priority	Low
Claimed Bandwidth	0

Table A-4. Sync)Channel Characteristics (continued

Menu Item	Default
H-P Sync	
Data Rate	2400
Channel Clocking	Tx-Internal/Rx-Internal
Maximum Transmit Block Size	9876
Maximum Receive Block Size	9876
Interface Type	To DTE
Carrier Mode	Constant
Sync Character	16
Number of Leading Syncs	3
Pad Character	FF (hexadecimal)
Number of Leading Pad Characters	1
Number of Trailing Pad Characters	2
Buffer Control	None
Clock Flow Control	Enable
DSR Control	Normal
Priority	Low
Claimed Bandwidth	0
MICOM DLC	
Data Rate	2400
Channel Clocking	Tx-Internal/Rx-Internal
Interface Type	To DTE
Carrier Mode	Constant
Buffer Control	None
Clock Flow Control	Enable
DSR Control	Normal
Priority	Low
Claimed Bandwidth	0

Table A-4. Sync Channel Characteristics (continued)

Menu Item	Default
MICOM Voice	
Data Rate	9600
Channel Clocking	Tx-Internal/Rx-Internal
Maximum Transmit Block Size	1024
Maximum Receive Block Size	1024
Interface Type	To DTE
Carrier Mode	Constant
Buffer Control	None
Clock Flow Control	Enable
DSR Control	Normal
Priority	Low
Claimed Bandwidth	0
TDM	
Data Rate	2400
Channel Clocking	Tx-Internal/Rx-Internal
Interface Type	To DTE
Sync Character	FF (hexadecimal)
DSR Control	Normal
Fast Packet	
Data Rate	2400
Sync Character	FF (hexadecimal)
DSR Control	Normal
Priority	Low
Claimed Bandwidth	0

Table A-5. Frame Relay Link Defaults

Menu Item	Default
Frame Relay Link Parameters	
Clock Speed	64000
Port Clocking	Tx-External/Rx-External
Maximum Frame Size	4096
Local Management Protocol	Annex D
DLCI Parameters	
Committed Burst Size Forward (Bc.Fwd)	0
Committed Burst Size Backward (Bc.Bwd)	0
Excess Burst Size Forward (Be.Fwd)	0
Excess Burst Size Backward (Be.Bwd)	0
Committed Information Rate Forward (CIR.Fwd)	0
Committed Information Rate Backward (CIR.Bwd)	0
Local Management Protocol Parameters (Annex D and LMI, Rev. 1)	
Full Status Polling Counter (N391) (nN1)	6
Error Threshold (N392) (nN2)	3
Monitored Events Count (N393) (nN3)	4
Link Integrity Verification Timer (T391) (nT1)	10
Polling Verification Timer (T392) (nT2)	15
Access Link Mode	User

Table A-6. Primary and Secondary Link Parameters

Primary Link Control Parameters	
Terminate Switched Voice Calls	No
Forced On	Yes

Secondary Link Control Parameters	
Terminate Switched Voice Calls	No
Forced On	No
Link Rate	Sync External Clocks

Worksheets B

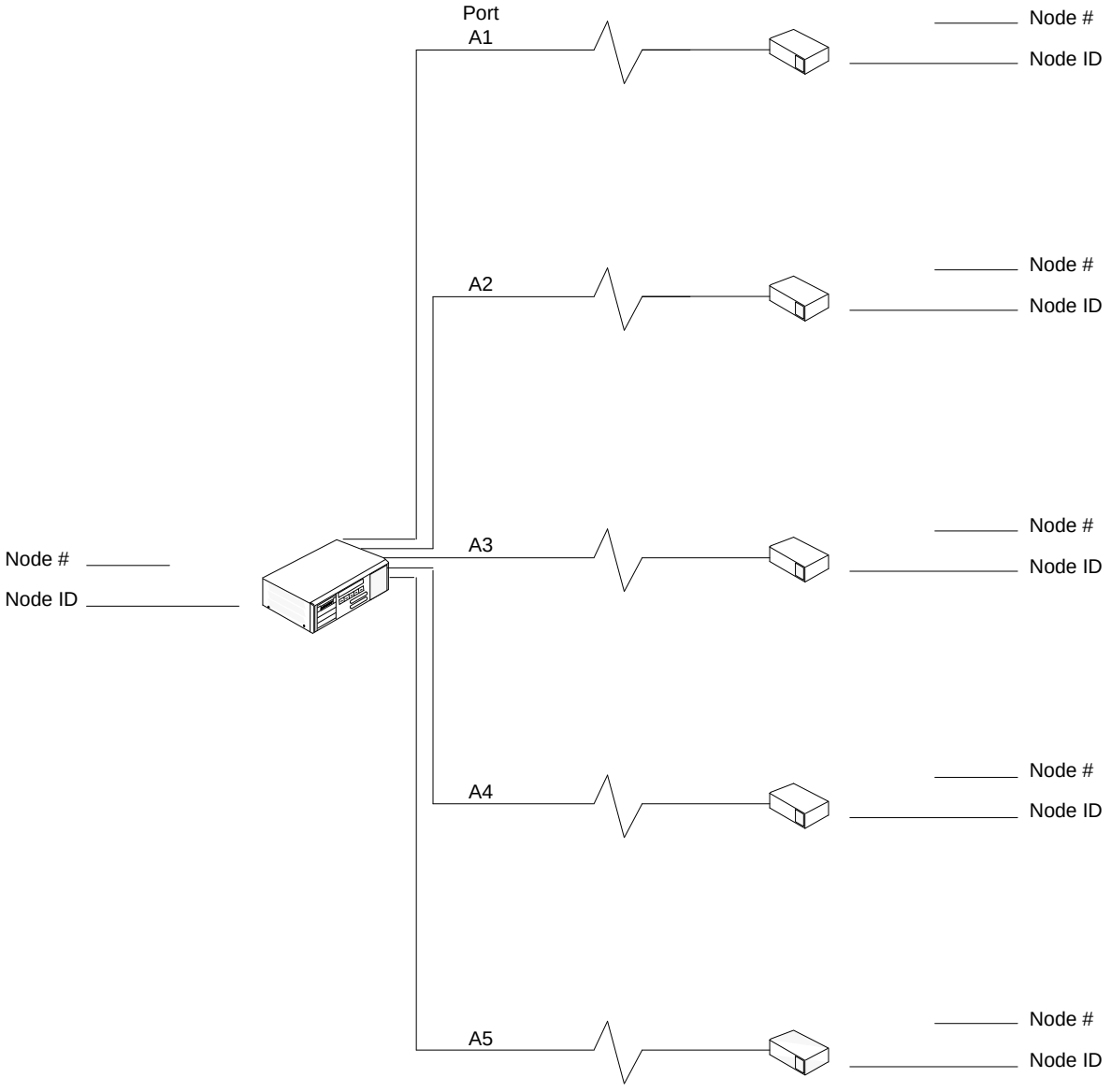
This section contains worksheets to help organize and keep a record of your network and of your async and sync channel configurations. Copy these sheets as many times as necessary. Keep a completed copy of these sheets near the Marathon unit.

Note: Not all of the options listed apply to all of the units.

The following worksheets are provided

	Page
Worksheet for Planning Node Numbers and Node IDs of the Local Hub Group	B-2
Port Configuration Worksheet	B-3
Secondary Link Worksheet	B-4
Frame Relay Worksheet	B-5
Command Facility Parameters Worksheet	B-7
Sync Protocol and Channel Worksheet	B-8
Async Channel Characteristics Worksheet	B-10
Async Channel Features Worksheet	B-12
Async Channel Switching Parameters Worksheet	B-14
Async Channel Extended Features Worksheet	B-16
Async Classes Worksheet	B-17
Dialog Messages Worksheet	B-18
Record of Passwords Worksheet	B-19

Worksheet for Planning Node Numbers and Node IDs of the Local Hub Group
(Complete one worksheet for each Marathon node in the Network)



Note: Remember that each node must have a unique node name and number in the entire network.

Port Configuration Worksheet

Port	Type	Link Rate/Sync Protocol

Secondary Interconnect Link Worksheet

Port	Type (Secondary/ Primary	Associated Link	Connected to Node/Port	Control Parameters	
				Terminate Switched Voice Calls	Forced On

Utilization Thresholds

Secondary On Threshold %	On Threshold Time Length (minutes)	Secondary Off Threshold %	Off Threshold Time Length (minutes)	Backup Only

Frame Relay Worksheet

Node ID (name)

Port No.

DLCI Parameters

DLCI	Level 2 Protocol	Bc.Fwd	Bc.Bwd	Be.Fwd	Be.Bwd	CIR.Fwd	CIR.Bwd

Frame Relay Link Parameters

Node ID (name)

Port	Clock Speed	Port Clocking	Maximum Frame Size	Network Address	Local Management

Local Management Protocol Parameters (Annex D or LMI, Rev 1 Parameters)

Port	Full Status Polling Counter (N391) (nN1)	Error Threshold (N392) (nN2)	Monitored Events Count (N393) (nN3)	Link Integrity Verification Timer (T391) (nT1)	Polling Verification Timer (T392) (nT2)	Access Link Mode

Command Facility Parameters Worksheet

Node ID (name)

Option	Entry
Time	___
Date	___
Event Reporting	
Alarm Reporting	
Switch Statistics Reporting	
Periodic Reporting Interval	
Output Event/Alarm Reports	
Output Periodic Reports	
Remote Node ID	
External Modem Priority[1]	
External Modem Phone #[1]	
External Alarm Relay[1]	
No Activity Timeout	
LCD Banner Message[1]	
Day of the Week	___

[1] Not applicable to the Marathon 2K or 3K.

Sync Protocol and Channel Worksheet

Node ID (name)

Channel No.	Protocol	Data Rate	Channel Clocking	Maximum Transmit Block Size	Maximum Receive Block Size	Interface Type

Channel No.	Carrier Mode	Sync Char.[1] 1	Sync Char.[1] 2	# of Leading Syncs	Pad Char.	# of Leading Pad Chars.	# of Trailing Pad Chars.

[1] It is very important that the current sync character be configured; otherwise false syncing may occur.

Sync Protocol and Channel Worksheet (continued)

Node ID (name) (cont'd)

Channel No.	Encoding	Idle Fill	Buffer Control	Clock Flow Control	DSR Control	Priority	Sync Claimed Bandwidth

Channel No.	Force Connected to Node Id/Channel No.

Async Channel Characteristics Worksheet

Node ID (name)

Channel No.	Data Rate	Code Level	Parity	Stop Bits	Echo	To Host/ To Terminal

Async Channel Characteristics Worksheet (continued)

Node ID (name) (cont'd)

Channel No.	XON Char.	XOFF Char.	Buffer Ctrl	Flow Ctrl	CR Delay	LF Delay	FF Delay

Async Channel Features Worksheet

Node ID (name)

Channel No.	Priority	EIA Ctrl	Smooth Scroll	Tandem	Flow Control Strip	HP ENQ/ACK

Async Channel Features Worksheet (continued)

Node ID (name) (cont'd)

Channel No.	Sync Loss Disconnect	Command Mode Entry Sequence	Command Mode Access	Command Facility Main Menu Access	Local Channel Configuration

Async Channel Switching Parameters Worksheet

Node ID (name)

Channel No.	Connect Protocol	Unbalanced Rate	Call Inhibit	Receive Inhibit	Character Set	Matrix Switch

Async Channel Switching Parameters Worksheet (continued)

Node ID (name)

Channel No.	Resource Class	Destination Node/Class	Channel Password	If Force Connected, Node ID/Channel No.

Async Channel Extended Features Worksheet

Node ID (name)

Channel No.	Data Compression	Remote CTS Control

Async Classes Worksheet

Node ID (name)

Class #	Class Name	Secondary Class	Class Password	Class Message	Class No Activity Timeout	Ports Attached To Class

Dialog Messages Worksheet

Node ID (name)

Option	Entry
Channel Password	
Welcome	
Class Request	
Class Password	
Connected	
Queue	
Busy	
Disconnected	
No Answer	
Unavailable	
Unassigned	
Incompatible	
Call in Progress	

Record of Passwords Worksheet

Node ID (name)

Type	Password
Global	
Status	
LCD/Keypad[1]	
NETMan ($PPP)	
$DLD Facility	

- Channel Passwords are recorded on page B-15.
- Class Passwords are recorded on page B-17.

[1] Not applicable to the Marathon 2K or 3K.

Messages C

The messages contained in this appendix include those messages received from the optional modules.

Page

Screen Display Messages C-2

LCD/Keypad Messages C-16

Note: The STADIA Integration Hub does not offer an LCD Keypad.

Message Type:

Alarm	Vital to the system's operation; may cause an interruption to that operation.
Event	Occurs in the regular operation of the system; most likely will not affect the system's operation.
Dialog	Configurable async user messages.
Diag	Diagnostic messages.
Info	Informational.

Key:

VF	=	Voice Frequency.
ADB	=	Automatic Dial Backup.
<>	=	Brackets indicate configurable messages. Default is shown.
cl	=	Class name, voice/fax extension number, or MATRIX (if matrix switching is used).
ci	=	Channel (port) number. In the case of frame relay ports, the port number is followed by a decimal point and the four-digit number of the local DLCI (the DLCI attached to the local unit).
ds	=	T1 Line interface either DS-1 or DSX-1
li	=	E1 Line interface either L1 or L2
n/*c*	=	Node ID (n)/channel number (c).[1]
ni	=	Node ID.
nn	=	A variable amount.
ml	=	Module location letter [B–E].

[1] In some cases the channel number will display the following:
CMD = Command Facility
PPP = NETMan connection
PPP*n* = One of the NETMan secondary channels (*n* could be 1–5)

Table C-1. Screen Display Messages

Message	Message Type	Explanation
ni [ml] ADDING CHECKSUMS.	Info	The Integration Router Module is performing checksums on the new code which has just been downloaded.
ni (*li* or *ds*) ALARM INDICATION SIGNAL CLEARED	Alarm	The ALARM-indication-signal has cleared—the T1 or E1 line is available. The ones condition previously detected is clear.
ni (*li* or *ds*) ALARM INDICATION SIGNAL DETECT	Alarm	This indicates that T1 or E1 line is unavailable. All ones condition exists for 100 milliseconds or longer.
ANSWER & FORCE CONNECT ARE INCOMPATIBLE	Info	You have attempted to force connect a secondary link at the answer side of the link. You must force connect the link at the originate side of the link.
APPLICABLE TO RTS FUNCTIONALITY ONLY	Info	In trying to configure an integral LAN module, you have selected a module location which does not support RTS functionality. (Most likely there is a bridge installed in the module location you selected. This does not require the configure menu.)
ni BATTERY LOW	Alarm	Indicates the CMOS battery at node *ni* is low and a power loss could result in a cold start of the system.
ni [ml] BOOT *nnn-nnnn-nx*	Info	The Integration Router Module has been reset and is using the version of software indicated (*nnn*).
ni BUFFER OVERFLOW, CHANNEL *ci*	Alarm	Data has been lost at node *ni,* port *ci* because of an overflow condition.
<BUSY>	Dialog	Message is only sent to async channel call originators using matrix switching when the requested resource is in use by another network user.
CALL INITIATION ALARM	Alarm	Unable to connect to a MICOM mux on an X.21 link after the configured number of tries. Data in the buffers has been discarded.
<CALL IN PROGRESS>	Dialog	Indicates that an async call connection is in progress across the interconnect link.
ni [ml] CCM BAD CHECKSUM.	Event	The Integration Router Module code download file was not received correctly due to one of the following reasons: • Wrong image file • Corrupted file • Incomplete transmission

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
ni [ml] CCM HEADER FAIL.	Event	The header portion of the Integration Router Module code download file was not received correctly.
ni [ml] CCM DOWNLOADING	Info	Code download to the Integration Router Module is in progress.
ni [ml] CCM LOAD WAITING	Info	The Integration Router Module is ready for code download via a CCM async port.
ni [ml] CCM LOAD SUCCESS.	Info	The code download to the Integration Router Module is completed.
ni CD ACQUIRE *ci*	Event	Indicates carrier has been detected on the mux or interconnect link indicated by *ci*.
ni CD LOSS *ci*	Alarm	Indicates carrier loss on link *ci*.
ni CD LOSS LINK *ci*	Alarm	Communications has been lost between the local unit and the frame relay switch.
CHANNEL CURRENTLY CONFIGURED AS PRIMARY	Info	Port is configured as a primary link. Before you can configure this port as other than an interconnect link, you must deassign it from the secondary link. (Go into Port Configuration and start as if configuring the secondary link and answer no at the primary link prompt.)
CHANNEL *ci* CURRENTLY USING COMMAND FACILITY	Info	Command Facility Main Menu functions are already being used by the port indicated (*ci*).
CHANNEL INOPERABLE	Info	You have requested channel status for a voice or fax port that is non operational.
CHANNEL NOT CONNECTED, IN QUEUE OR INHIBITED	Info	Attempt has been made to force disconnect to one of the following: • A port already disconnected • An inhibited port such as a link.
CHANNEL NOT INSTALLED	Info	Attempt has been made to configure or test a voice/fax port. However the port number selected is not a voice/fax port.
CHANNEL(S) NOT INSTALLED	Info	Attempt has been made to view the status or configuration of a range of ports that are not voice ports.
CHANNEL REQUEST UNSUCCESSFUL, PLEASE RETRY	Info	Voice/fax port you are trying to test is not working properly.
CHECK CONFIGURATION	Info	Your Marathon 3K has lost a configuration update due to a power loss. Check your configuration, it may have reverted to earlier configuration values.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
CHECK FOR PROPER DEVICE INSTALLATION	Info	Selection entered required either an integral ISU, T1, E1 or LAN module. You may have entered the wrong number.
ni CMOS ERROR	Alarm	Problem detected in writing to the configuration area. Contact your Certified MICOM Distributor. Also, on the Marathon 3K, flash has failed. Select the *Save* option and see if condition corrects itself. If not, contact your MICOM Certified Distributor.
COMMAND FACILITY DISABLED	Info	Command Facility Main Menu cannot be accessed by the port requesting it.
COMMAND INHIBITED BY PASSWORD	Info	Password entered does not permit access to the selected menu. (Password is status type rather than global type and permits access only to view, status and disconnect functions.)
COMMAND MODE PORTS BUSY	Info	All available ports to the Command Mode are busy. Up to two ports and the dedicated Command Port (on the NMS module) may access the Command Mode at one time.
CONFIGURATION INHIBITED WRONG CHANNEL TYPE	Info	Async or sync port configuration is being attempted, but the channel number selected is for a port of a different channel type.
CONFLICT IN CHANNEL TYPES	Info	Attempt has been made to copy channel parameters of two dissimilar channel types.
CONNECT *n/c n/c cl*	Event	Indicates the pair of ports that have been connected and the called port's class or extension number (in the case of voice/fax ports). Also indicates a force connect has been made.
CONNECT FAIL	Info	Unable to connect to the remote Command Facility from the local Command Facility.
CONNECT FAIL MATRIX *n/c*	Event	Matrix connection request made by the local port did not complete successfully. Also, password may be incorrect.
<CONNECTED>	Dialog	Message is sent to the async user when a connection has been established across the link (L or H may appear at the end if there are unbalanced rates). L = you are connected to a lower speed device H = you are connected to a higher speed device
DATA LOSS	Info	X.21 bis network is unable to synchronize across the link. Your data is lost.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
DATE *nn/nn*	Event	Appears on each new day and any time the date is configured.
ni DDS IN SERVICE LINK *ci*	Event	ISU at node *ni* has returned to service for link *ci*.
ni DDS OUT OF SERVICE LINK *ci*	Event	ISU at node *ni* is out of service for link *ci*.
ni DDS RUNNING LOOP TEST LINK *ci*	Event	A loop test is being run on the ISU at node *ni* for link *ci*.
ni [ml] $DLD CONNECTED.	Info	The Integration Router Module is connected to the download facility and is ready for code download.
DISABLED	Info	Function is disabled.
<DISCONNECTED>	Dialog	Connection has been broken. Sent to call originator only when switching is used (not for forced connections).
DISCONNECT *n/c n/c*	Event	A pair of ports has been disconnected.
ni DLCI ACTIVE *ci*	Event	The specified DLCI on the link has become active.
ci DLCI ALREADY PRESENT	Info	You are attempting to add an existing DLCI.
ni DLCI DELETED *ci*	Alarm	The locally attached frame relay switch has reported to the local unit that the DLCI has been deleted.
ni DLCI INACTIVE *ci*	Alarm	The locally attached frame relay switch has reported to the local unit that the DLCI is inactive.
ci DLCI NOT ADDED, INSUF RESOURCE	Info	There is insufficient processor memory to add the requested DLCI.
ni [ml] DONE	Info	The Integration Router Module has erased its Flash memory in preparation for code download.
DOWNLOAD COMPLETE	Info	The download process in now complete.
DOWNLOAD IN PROGRESS – CAN NOT CONFIGURE	Info	You have attempted to configure a port which is in the process of downloading code. Try again later.
DOWNLOADING FILE CHECKSUM ERROR	Info	An error was recorded during the download process. Try again.
DOWNLOAD IN PROGRESS, TRY LATER	Info	You have attempted to configure, to run diagnostics, or to reset a port or node that is currently downloading code. Try again later.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
ni DUPLICATE NODE-ID *ci*	Info	• Two nodes in the network have the same ID. • There is a closed loop in a non-mesh network (unit).
<ENTER CLASS>	Dialog	Asks the user for the destination class name.
<ENTER CLASS PASSWORD>	Dialog	Asks the user for the password associated with the destination port's class. If no password is configured for the class, the user should press Enter.
<ENTER PASSWORD>	Dialog	Asks for a password associated with the signed on port.
ERASE ABORT	Info	The erasing process of the Flash memory has been aborted.
ERASE COMPLETE	Info	Flash memory has been erased.
ni [ml] ERASING FLASH. . .	Info	The Integration Router Module is erasing its Flash memory in preparation for code download.
ERROR: INVALID CHECKSUM IN FILE!	Alarm	The download code has an error, try again.
ni [ml] FILE HEADER READ FAILED.	Event	The header data received for the code download file was not correct for the Integration Router Module.
ni [ml] FILE LOADED FAILED, *nnnnnn* BYTES LOADED	Event	The Integration Router Module code download data transfer started but did not successfully complete. The number of bytes actually transferred is *nnnnnn*.
FLASH WRITE ERROR	Event	An error has occurred while attempting to download code to a Flash memory. Verify that receiving Flash memory is erased before making another attempt.
FORCE CONNECT: PRIMARY NOT ASSIGNED	Info	You have attempted to force connect a secondary link which has no primary link assigned. Return to the Port Configuration Menu and assign a primary link to this secondary link before continuing.
FOX TEST ACTIVE	Diag	Async channel output test has been activated.
ILLEGAL INPUT	Info	Entry, as received, cannot be executed. Could be caused by an incorrect password or an incorrect broadcast message.
ILLEGAL SELECTION	Info	Number entered is not on the list of items of the displayed menu.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
<INCOMPATIBLE>	Dialog	Attempted connection is not compatible with the configuration.
INCOMPATIBLE LINK TYPES	Info	You are trying to connect a mux link to the port configured as an interconnect link or vice versa.
INCORRECT CHANNEL TYPE	Info	Port selected for the test desired is of the wrong type or an attempt has been made to broadcast to one of the following: • A link port • An out of service (OOS) port • A voice port
INPUT FILE RECEIVED. RESET	Info	The download code was received correctly. The system automatically resets showing the boot ID and $DLD prompt.
INHIBITED	Info	MICOM mux connected to the Command Facility tried to activate a remote composite loopback on the link.
INPUT REQUIRED	Info	Enter without a data entry was received for a function which requires a data input, such as entering a channel number, or a new password.
INPUT TEST ACTIVE	Diag	Async output test has been activated.
INTEGRAL DEVICE NOT INSTALLED	Info	No integral device has been installed in the module location you specified.
INTEGRAL VIEW CONFIGURATION NOT SUPPORTED	Info	You attempted to view the configuration parameters of an Integral ISU. There is no view for an ISU.
INVALID DATA	Info	One of four possibilities has occurred: • The remote node ID was entered for a channel statistics request. • There was an attempt to enable/disable a link. • A remote node ID was entered for port configuration. • The entered value is invalid or you have used the improper syntax.
INVALID DESTINATION STRING	Info	You have attempted to force connect to an unknown node.
INVALID DOWNLOAD FILE	Event	The file you have attempted to download is invalid; check the file name.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
INVALID ENTRY	Info	• A port other than A1 or A2 was entered when a request was made for status or configuration of an integral device. • You have attempted to duplicate a class which has already been defined.
INVALID FILE CHECKSUM	Event	An error has occurred during code download. Try again.
INVALID FLASH PLEASE DOWNLOAD	Alarm	You are attempting to access a T1 module whose Flash memory has been erased. Perform a code download and try again.
INVALID NUMBER	Info	• The prompt requires a numeric input. • In configuring a voice or fax extension number, you have entered fewer or more than the required number of digits.
INVALID OR UNKNOWN DLCI [number input]	Info	You have attempted to delete, configure, or reset a DLCI that is unknown or invalid. Try again with valid DLCI.
IS SECONDARY LINK; MUST REMOVE PRIMARY LINK	Info	Port is configured as a secondary interconnect link. Before you can configure this port as other than a secondary interconnect link, you must deassign it from the primary interconnect link. (Answer *NO* at the primary link prompt.)
ISU DIGITAL LOOPBACK ACTIVE LINK # *ci*	Diag	ISU on link *ci* has been placed in digital loopback.
ISU LOCAL LOOPBACK ACTIVE LINK # *ci*	Diag	ISU on link *ci* has been placed in local loopback.
ISU LOCAL LOOPBACK WITH TP ACTIVE LINK # *ci*	Diag	This test places the local ISU on link *ci* in loopback, then verifies the operation of the ISU by sending and receiving the test pattern.
ISU TEST PATTERN ACTIVE LINK # *ci*	Diag	Test pattern generator on the ISU on link *ci* has been activated.
ISU TEST TERMINATED LINK # *ci*	Diag	Test for the ISU on link *ci* has been terminated.
ni LAN MODULE LOCATION [*ml*] DOWN	Info	LAN module in *ml* is not available for use.
ni LAN MODULE LOCATION [*ml*] UP	Info	LAN module in *ml* is operating and available.
LAN RESET: BAD COMMAND LENGTH	Alarm	The length of the message being received is too long. Verify the proper operation of your LAN module.
LAN RESET: NO ACTIVITY T/O	Event	LAN module is non-responsive and is resetting.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
LAN RESET: VIA COMMAND FACILITY	Event	A LAN module reset has been initiated at the Command Facility.
LAN RESET: VIA LAN MODULE	Event	A user on the LAN side has initiated a LAN module reset.
LAN RESET: LAN–>LAN RELOAD	Info	The Integration Router Module is resetting in preparation for code download via the LAN (from a Bootp/TFTP server).
LAN RESET: WAN–>LAN RELOAD	Info	The Integration Router Module is resetting in preparation for code download via a CCM async port.
ni LINE ALARM *ci*	Alarm	Link *ci* at node *ni* has a line alarm, indicating a high line error rate.
ni LINE ALARM LINK *ci*	Alarm	*If only port number displays:* Excessive line error rate between the local unit and the attached frame relay switch. *If the port and DLCI number displays:* Information between the units using ci is being lost. Does not apply to information sent in excess of the configured committed information rate (CIR) or burst sizes (Bc, Be). Possible causes, • CRC error • Frame relay discard due to congestion
LINK DOWN *ci*	Alarm	Local unit has timed out (40 seconds) waiting for sync to be acquired on link *ci*. Check the cabling, modem and remote unit for errors.
LINK RATES RESTRICTED TO 19.2 KBPS OR LESS	Info	You have attempted to configure a data rate higher than 19.2 Kbps on port A3 of the Marathon 5K Turbo. This is not permitted; select a lower rate.
LOCAL CHANNEL CONFIGURATION DISABLED	Info	Local Channel Configuration menu cannot be accessed by the async port requesting it.
LOCAL FOX	Diag	Port has been placed into a local fox loopback test.
ni LOCAL LINK RESTART *ci*	Event	• Node *ni* on link *ci* has been restarted. • Local node *ni* initiated a reset of the DLCI using the reported *ci.*
ni LOCAL SYSTEM RESET	Alarm	Local unit has been reset.
LOCAL TEST, ECHO INPUT	Diag	Port has been placed into a local echo loopback test.
LOCKED PARAMETER	Event	This parameter is locked out by the hardware configuration.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
LOGGING REPORT, TRY LATER	Event	Command Facility status/statistics functions are not available because periodic report is being output.
MAXIMUM DLCI'S ALREADY IN USE	Info	You are attempting to add a DLCI to a system already using the maximum number of DLCIs. Either delete a DLCI or do not attempt to add another one.
MODULE NOT OPERATIONAL	Info	LAN module is installed but not operational.
<NO ANSWER>	Dialog	Indicates that no answer was received from the async destination port. Causes include the following: • Remote port did not respond to connection protocol. • No response was received within the call time out period from the remote unit, although the ports are known by the local unit. • Call inhibit is enabled (*on*). • DTR = *low* = OOS.
ni NEW DLCI *ci*	Event	The unit has recognized a new DLCI on the frame relay interface.
ni NO ANSWER LINK *ci*	Event	The calling process has discontinued due to the absence of an answer tone on a local dial line.
NO ASYNC CHANNELS WITHIN RANGE	Info	A link port in the range selected is not configured for async.
ni [ml] NO BOOTP REPLY	Event	There was no response to the Integration Router Module's Bootp request broadcast for code download.
NODE-CHANNEL NOT AVAILABLE ENTER CARRIAGE RETURN TO CONTINUE	Info	A link port number was entered when a sync, async, or voice/fax channel number was required.
NODE ID ALREADY IN USE	Info	You are trying to configure a node ID which has already been assigned in the network.
NODE NUMBER ALREADY IN USE	Info	You are trying to configure a node number which has already been assigned in the network.
NO REMOTE CONNECT ACTIVE	Info	User is attempting a remote echo/fox test from Command Mode with no connection made.
NO SYNC CHANNELS WITHIN RANGE	Info	A port or ports in the range selected are not configured for sync.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
NOT ALLOWED	Event	An invalid mode of operation has been entered; it will not be supported.
NOT CONNECTED	Info	The link reported is not connected. If the link is frame relay, the DLCI reported is not connected.
NOT INTERCONNECT LINK	Info	You are attempting to attach a primary link to a secondary link and the primary link you have selected is not an interconnect link.
NOT SUPPORTED	Info	Requested voice or fax configuration parameter selected is not supported by your voice module.
NUMERIC REQUIRED	Info	You must enter a numeric character, try again.
OPERATIONAL PROCESSOR PASS	Event	Self test complete.
ni li OUT OF CAS FRAME	Alarm	The multiframe alignment signal has been lost on *li*. The two sides cannot sync up; check your configuration.
ni li OUT OF CAS FRAME CLEARED	Alarm	The out-of-CAS-frame condition has cleared on *li*.
ni li OUT OF CRC FRAME	Alarm	The remote side is not receiving what it expected on *li*. The CRC multiframe alignment is wrong.
ni li OUT OF CRC FRAME CLEARED	Alarm	The out-of-CRC-frame condition has cleared on *li*.
OUT OF RANGE	Info	Range of numbers entered is not available in the unit.
OUTPUT DATA TEST COMPLETE	Diag	Async channel output test is complete.
PRESS BREAK TO TERMINATE TEST	Diag	To terminate a channel loopback, or channel output test, press the **<break>** key.
PRIMARY MUST BE DEASSIGNED	Info	You are attempting to attach a secondary interconnect link to a link that is already assigned as primary to another interconnect link.
QUEUE *n/c cl*	Event	Port *c* of node *n* has been placed in a first come, first serve queue for the next available port in the class.
ni (*li* or *ds*) RED ALARM	Alarm	The T1 or E1 line is not operational. Indicates that an out-of-frame condition existed for the last 100 milliseconds or longer.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
ni (*li* or *ds*) RED ALARM CLEARED	Alarm	The red ALARM has cleared — the out-of-frame condition has been absent for 100 milliseconds or longer.
ni li REMOTE ALARM	Alarm	A red alarm and frame alignment signaling problems have been detected at the remote side of *li*. Check your configuration or the remote unit may require maintenance.
REMOTE FOX	Diag	Port has been placed into a remote fox loopback test.
ni REMOTE LINK RESTART *ci*	Event	Remote node *ni* on link *ci* has been restarted. The link (and DLCI, if applicable) noted is the local unit (not remote).
REMOTE MUX DOES NOT SUPPORT COMPRESSION	Info	You attempted to enable data compression on the remote node and either the link is down or the MICOM mux does not support compression.
ni li REMOTE SIGNALLING ALARM	Alarm	The remote side has detected a multiframe alignment signal frame condition on *li*. Check the configuration or the remote unit may require maintenance.
ni li REMOTE SIGNALLING ALARM CLEARED	Alarm	The remote-signaling-ALARM is now clear on *li*.
REMOTE TEST, ECHO INPUT	Diag	Port has been placed into a remote echo loopback test.
REPORT INHIBITED	Info	Voice/fax status report has been requested for the MICOM mux. The MICOM mux cannot be connected: • Mux is in composite loopback • Link is out of sync
RESET REQ'D	Info	You have changed the sync protocol and did not perform a reset. It is necessary to reset the node before proceeding.
ni [ml] REQUESTING BOOTP:	Info	The Integration Router Module has broadcast a Bootp request for code download.
ni [ml] REQUESTING TFTP:	Info	The Integration Router Module has broadcast a TFTP GET request for code download.
SAVING; PLEASE WAIT	Info	The Marathon 3K is saving its configuration, please wait 20-30 seconds.
ni SECONDARY LINK CONNECT TERMINATED *ci*	Alarm	Connection of the secondary link has been terminated. Secondary link is put into standby status until again activated.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
ni SECONDARY LINK CONNECTING *ci*	Alarm	Primary interconnect link has either failed or the secondary link has been force-connected. Secondary link is in the process of establishing a link on port *ci*.
ni SECONDARY LINK ESTABLISHED *ci*	Alarm	Secondary link has been established and is now operating on port *ci* until either the primary interconnect link can be restored or the secondary link is force-disconnected.
ni SECONDARY LINK FAILURE *ci*	Alarm	Secondary link connection was unsuccessful or the link has been disconnected. It will try to reestablish the connection.
ni SECONDARY RETRY EXCEEDED, RESET LINK *ci*	Alarm	Secondary link cannot establish a connection. This message indicates there have been five consecutive failures. Reset the link and try again.
SECURITY VIOLATION	Info	There has been an error during the download process. Try again.
ni SL TIME OUT *ci*	Info	Sync loss has occurred continuously for 40 seconds.
ni SYNC ACQUIRE *ci*	Event	Synchronization has been achieved with the remote unit attached on link *ci*.
SYNC CHANNEL LOOPBACK *n/c*	Diag	Synchronous port *c* on node *n* has been placed into loopback mode.
SYNC CHANNEL *n/c* STOPPED	Alarm	Synchronous port *c* on node *n* has lost its output clock, or input end of frame is missing.
ni SYNC LOSS LINK *ci*	Alarm	*If only port number displays*, communication between the local unit and the frame relay switch has been lost. *If port and DLCI number displays,* communication between the local and remote unit over *ci* has been lost.
ni SYNC LOSS TIMEOUT *ci*	Event	The local and remote units have not been able to communicate in the last 20 seconds on link *ci.*
ni [ml] TFTP ACCESS DENIED	Event	The Integration Router Module does not have permission to access the code download file on the Bootp/TFTP server.
ni [ml] TFTP BAD CHECKSUM	Event	• The code download data received by the Integration Router Module from the Bootp/TFTP server was corrupted. • There was no response to the Integration Router Module's TFTP GET request to the Bootp/TFTP server for code download.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
ni [ml] TFTP DOWNLOADING	Info	The Integration Router Module is receiving code download data from a TFTP server.
ni [ml] TFTP LOAD SUCCESS	Info	The Integration Router Module code download from a TFTP server was successful.
ni [ml] TFTP NO SUCH FILE	Event	The file that the Integration Router Module requested to download from the Bootp/TFTP server does not exist.
THE CHANNEL MUST BE DISCONNECTED	Info	Channel type or protocol change is requested and the port is connected.
THIS CHANNEL MUST BE DISCONNECTED	Info	You are attempting to configure a secondary interconnect link and the channel is currently configured as a sync or async channel and is connected. Disconnect channel, then re-attempt port configuration.
ni li TS-16 AIS ALARM	Alarm	The CAS signaling is unavailable on *li*. Check your configuration.
ni li TS-16 AIS ALARM CLEARED	Alarm	The CAS signaling is now available on *li*.
T1/E1 CODE DOWNLOAD IS IN PROGRESS. PLEASE TRY LATER	Event	You have attempted to reset a T1 or E1 Access Module during a code download. Attempt the reset again when the download is complete.
T1/E1 MODULE IS INITIATING	Info	The T1 or E1 access module is initiating the software. You cannot access the module or erase the Flash memory until the process is complete.
<UNASSIGNED>	Dialog	• Node, class, module location, or port is unknown in the network. • Password for the class may be incorrect. • If matrix switching is disabled, this message will display when matrix switching is attempted.
<UNAVAILABLE>	Dialog	Requested resource exists, but is not in service (operational). Call inhibit may be *off* or DTR is *off*.
VOICE CHANNEL [*n/c*] [condition] BUSY OUT	Event	Voice/fax port *c* on node *n* has been put in a busyout state. [Conditions] may be: SYSTEM Where the link has experienced a sync loss, a force disable command or a force disconnect command. FORCED Where the network operator has put the channel in a busyout condition via a forced busy command.

Table C-1. Screen Display Messages (continued)

Message	Message Type	Explanation
VOICE CHANNEL [*n/c*] BUSYOUT CLEARED	Event	Termination of a busyout condition has occurred on voice/fax port *c*.
VOICE CHANNEL [*n/c*] INPUT LEVEL: *nn* dBm	Event	The current dBm level for voice/fax port *c* on node *n* is *nn* (–25 to +1) dBm.
VOICE CHANNEL [*n/c*] LOCAL LOOP TEST	Diag	Voice or fax port *c* on node *n* has started the diagnostic local loop test.
VOICE CHANNEL [*n/c*] RESET	Event	The voice or fax port has been reset and re-initialized to the current configuration.
VOICE CHANNEL [*n/c*] SELF TEST FAIL	Diag	Voice or fax port *c* on node *n* has completed the internal diagnostic tests unsuccessfully.
VOICE CHANNEL [*n/c*] SELF TEST PASS	Diag	Voice or fax port *c* on node *n* has completed the self diagnostic tests successfully.
VOICE CHANNEL [*n/c*] TEST CLEARED	Event	Voice or fax port *c* on node *n* has cleared (stopped) the current diagnostic test.
<WAITING Q=*n*>	Dialog	Sent whenever the port is placed in a queue (after requesting a class which is busy). This message will appear whenever a printable character is typed or Enter pressed; it indicates your place (*n*) in the queue.
WRONG HARDWARE PLATFORM!!	Info	You have attempted to download a code that is intended for a different hardware platform.
ni ds YELLOW ALARM	Alarm	A Red Alarm was detected at a remote location on *ds*.
ni ds YELLOW ALARM CLEARED	Alarm	The remote Red Alarm is now cleared on *ds*.

LCD Messages

Message Type:

E/A = Event or alarm message.

Info = Information message.

Key:

ni = Node ID.

ci = Indicates a channel number.

n/*c* = Node ID/channel number.

ml = Module location letter [B-D].

nn = Variable value.

Table C-2. LCD Messages

Message	Message Type	Explanation
ni [ml] Adding checksums. .	Info	The Integration Router Module is performing checksums on the new code which has just been downloaded.
Are you sure?	Info	Reset is requested. If answer is yes proceed with reset by pressing the EXEcute key. If the answer is no, terminate without a reset by pressing *any other key* except the EXEcute key.
Are you sure? EXE forces a reset	Info	You attempted to reconfigure node number and ID. This invokes a reset and this message. Press EXE to accept new configuration and invoke the reset. Press any other key to abort.
Battery low *ni*	E/A	CMOS battery at node *ni* is low and a power loss could result in a cold start of the unit.
ni [ml] CCM Bad checksum.	Event	The Integration Router Module code download file was not received correctly. Three possible reasons are the following: • Wrong image file • Corrupted file • Incomplete transmission
ni [ml] CCM Header fail.	Event	The header portion of the Integration Router Module code download file was not received correctly.
ni [ml] CCM Downloading	Info	Code download to the Integration Router Module is in progress.
ni [ml] CCM Load waiting	Info	The Integration Router Module is ready for code download via a CCM async port.

Table C-2. LCD Messages (continued)

Message	Message Type	Explanation
ni [ml] CCM Load success.	Info	The code download to the Integration Router Module is completed.
ni [ml] Boot *nnn-nnnn-nx*	Info	The Integration Router Module has been reset and is using the version of software indicated.
Channel not available	Info	Selected port is inoperative or module location is empty.
Channel type not applicable	Info	Port configuration for selected port does not apply for the function requested. **Example:** You request a channel reset for a port configured as a link.
ni CMOS Error	E/A	Marathon software has detected a problem writing to the configuration area. Contact your service representative.
ni [ml] $DLD Connected.	Info	The Integration Router Module is connected to the download facility and is ready for code download.
ni [ml] Done	Info	The Integration Router Module has erased its Flash EPROMs in preparation for code download.
ni [ml] Erasing flash. . .	Info	The Integration Router Module is erasing its Flash EPROMs in preparation for code download.
ni [ml] File header read failed.	Event	The header data received for the code download file was not correct for the Integration Router Module.
ni [ml] File loaded failed, *nnnnnn* bytes loaded	Event	The Integration Router Module code download data transfer started but did not successfully complete. The number of bytes actually transferred is *nnnnnn*.
Invalid name character/s	Info	Selected text contains a character(s) or embedded spaces which are not allowed. **Example:** Selecting a node name that begins with a numeric or contains embedded spaces.
Invalid password	Info	Password entered does not match the configured password.
ni/ml LAN Module down	Info	LAN module in *ml* is not available for use.
ni/ml LAN Module up	Info	LAN module in *ml* is operating and available.
LAN Reset: LAN–>LAN reload	Info	The Integration Router Module is resetting in preparation for code download via the LAN (from a Bootp/TFTP server).

Table C-2. LCD Messages (continued)

Message	Message Type	Explanation
LAN Reset: Bad command length	Alarm	The length of the message being received is too long. Verify the proper operation of your LAN module.
LAN Reset: No activity t/o	Event	LAN module is non-responsive and is resetting.
LAN Reset: Via Command Facility	Event	A LAN module reset has been initiated at the Command Facility.
LAN Reset: Via LAN module	Event	A user on the LAN side has initiated a LAN module reset.
LAN Reset: WAN–>LAN reload	Info	The Integration Router Module is resetting in preparation for code download via a CCM async port.
Link down *ci*	E/A	Local Marathon unit has timed out (30 seconds) waiting for sync to be acquired on link *ci*. Check cabling, modem, and remote unit for errors.
Link restored *ci*	E/A	Link *ci* has been restored and is in sync.
Local link reset *ci*	E/A	Local link *ci* has been reset.
New date: *nn/nn*	E/A	Appears at the beginning of each new day and when reconfigured.
No action taken. Depress any key	Info	You elected to terminate a reset request by pressing any key other than the EXEcute key when the display prompted *Are You Sure?*
ni [ml] No Bootp reply	Event	There was no response to the Integration Router Module's Bootp request broadcast for code download.
No device associated with channel	Info	Selected link has no integral device associated with it.
No device response	Info	The selected port is temporarily busy. Usually a second attempt will succeed.
No system messages	Info	Message log is currently empty.
No voice installed. Depress any key	Info	No voice/fax module is installed in requested port location.
Number already in use. Depress any key	Info	You are trying to assign a local node number that has already been assigned.

Table C-2. LCD Messages (continued)

Message	Message Type	Explanation
Out of range	Info	Selected port exceeds the available number for type of module installed in selected module location. **Example:** The selection is for A10. On the CCM (module A), there is no designated port 10.
Remote link reset *ci*	E/A	Remote link (*ci*) has been reset.
Reset issued. System initializing.	Info	Requested cold reset is executing. System is initializing to the factory default settings.
ni [ml] Requesting TFTP:	Info	The Integration Router Module has broadcast a TFTP GET request for code download.
Self test passed	E/A	All power-up diagnostics have been successfully completed.
Slot empty or module ID invalid	Info	Hardware Overview option from the Configure Local Nodes menu has been selected, and module location is either empty or the ID of the installed module is somehow invalid.
Terminated	Info	A diagnostic test has been stopped (terminated).
ni [ml] TFTP Access denied	Event	The Integration Router Module does not have permission to access the code download file on the Bootp/TFTP server.
ni [ml] TFTP Bad checksum	Event	• The code download data received by the Integration Router Module from the Bootp/TFTP server was corrupted. • There was no response to the Integration Router Module's TFTP GET request to the Bootp/TFTP server for code download.
ni [ml] TFTP Downloading	Info	The Integration Router Module is receiving code download data from a TFTP server.
ni [ml] TFTP Load success	Info	The Integration Router Module code download from a TFTP server was successful.
ni [ml] TFTP No such file	Event	The file that the Integration Router Module requested to download from the Bootp/TFTP server does not exist.
Warning: Reset occurs. EXE to execute	Info	You requested a menu option that involves a warm reset. This occurs in some channel loopback and integral diagnostic selections. Press EXEcute to continue, any other key to abort.

Indicators D

Communications Control Module Indicators

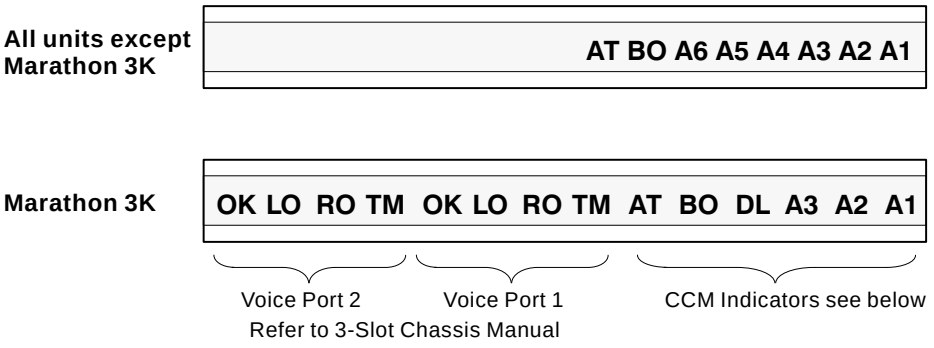

All units except Marathon 3K
AT BO A6 A5 A4 A3 A2 A1
Marathon 3K
OK LO RO TM OK LO RO TM AT BO DL A3 A2 A1
Voice Port 2
Voice Port 1
CCM Indicators see below
Refer to 3-Slot Chassis Manual

Table D-1. Communications Control Module Indicators

Indicator	Off	Flashing	On
AT Active Mode	Indicates a fault or test condition	The unit is in a loopback test mode	Normal Operation
BO Buffer Overflow	Buffer utilization is normal	Buffer utilization exceeding 87%	Data has been lost due to a buffer overflow
A1 Port A1	Error free data is passing through the link	High error rate on link A1, or synchronization has been lost with the remote unit on link A1	Receiving own transmit data, modem is in loopback
A2[1] Port A2	No data activity	Data Activity	Data Activity
A3[1] Port A3	No data activity	Data activity	Data activity
A4[1,2] Port A4	No data activity	Data activity	Data activity
A5[1,2] Port A5	No data activity	Data activity	Data activity
A6[1,2] Port A6	No data activity	Data activity	Data activity

[1] If configured as a link, the indicator values are the same as for A1.
[2] Not on Marathon 3K.

Note: On a force-connected sync port using either Fast Packet or TDM protocols, the indicator will remain *on* continuously.

Table D-2. Initialization Stages of the Integration Unit

	AT	BO	A6[1]	A5[1]	A4[1]	A3	A2	A1
Core Local RAM Test	❍	●	❍	❍	❍	❍	❍	❍
Static Memory of FEATUREPAK/ FlashPak Test	❍	●	●	❍	❍	❍	❍	❍
FEATUREPAK/FlashPak PROM Checksum Test	❍	❍	●	❍	❍	❍	❍	❍
Initialization of Ports Proceeding	❍	❍	❍	●	❍	❍	❍	❍
Link Processor RAM Test[2]	❍	●	❍	●	❍	❍	❍	❍
Link Processor Code Checksum[2]	❍	❍	●	●	❍	❍	❍	❍
Code space on Static RAM Test	❍	●	●	●	❍	❍	❍	❍
Code moving to Static RAM for execution	❍	●	●	●	●	❍	❍	❍

Key:

❍ LED off

● LED on

1 Not on Marathon 3K.

2 Available on Marathon 10K and 20K only.

3 On units with FlashPak or Marathon 3K.

Table D-3. Communications Control Module Error Conditions During System Initialization

	AT	BO	A6	A5	A4	A3	A2	A1
Normal equipment status	●	❍	x[1,2]	x[1]	x[1]	x[1]	x[1]	x[1]
ROM test failure[3] (FEATUREPAK or FlashPak cartridge failure)	❍	❍	●	❍	❍	❍	❍	❍
CMOS failure [3,4]	❍	❍	❍	❍	❍	❍	❍	●
Battery low[5]	❍	❍	❍	❍	❍	❍	●	❍
RAM failure in FEATUREPAK or FlashPak	❍	●	●	❍	❍	❍	❍	❍
Parity error	❍	●	❍	●	❍	●	❍	●
FEATUREPAK or FlashPak not installed properly or defective Marathon unit	●	●	●	●	●	●	●	●
RAM test failure (CCM)[3]	❍	●	❍	❍	❍	❍	❍	❍
Link processor local RAM test failure[2]	❍	●	❍	●	❍	❍	❍	❍
Link processor code load failure[2]	❍	❍	●	●	❍	❍	❍	❍

Key:

❍ LED off

● LED on

x not applicable

1 If configured as a link, this indicator blinks with no established link.

2 Available on Marathon 10K and 20K only.

3 Contact your MICOM Certified Distributor.

4 System can still operate with CMOS failure. All configuration data has been lost in the affected CMOS section and default values supplied.

5 System can still operate with low battery. Configuration data may be lost if unit loses power.

Marathon 3K Indicators

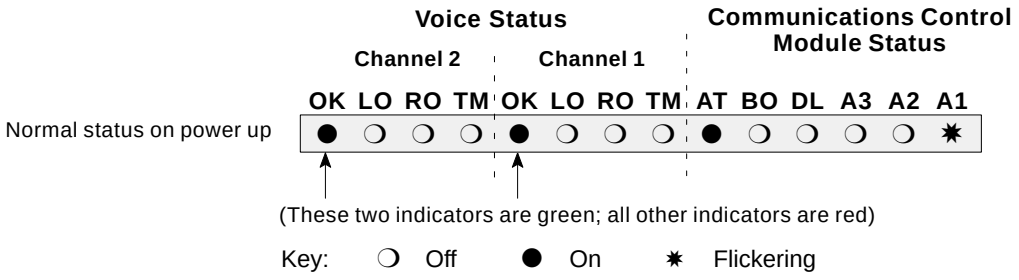

Voice Status
Communications Control Module Status
Channel 2
Channel 1
OK LO RO TM OK LO RO TM AT BO DL A3 A2 A1
Normal status on power up
(These two indicators are green; all other indicators are red)
Key: ❍ Off ● On ✷ Flickering

Table D-4. Marathon 3K Indicators

	Voice				Communications Control Module					
	OK	**LO**	**RO**	**TM**	**AT**	**BO**	**DL**	**A3**	**A2**	**A1**
Normal equipment status (see Note below)	●	❍	❍	❍	●					x[1]
Voice channel is in test mode				●						
Remote voice channel is off hook	●	◐	●	❍						
Local voice channel is off hook	●	●	◐	❍						
Channel is functioning properly	●									
Ready for Communications Control Module code download process (illuminated for 17-20 seconds upon power on or hardware reset)				●		●	●			
Invalid voice interface strapping, restrap the voice port. If the same indicator pattern displays after reboot, contact your MICOM Certified Distributor.	✲ or ❍	●	●	●						
Error condition detected by RAM test, contact your MICOM Certified Distributor.	❍	●	●	❍						

Key:
❍ Off ◐ Can be off or on ● On ✲ Flashing

[1] If configured as a link, this indicator blinks with no established link.

Note: If the voice indicator lights display a normal equipment status, but you cannot communicate over that voice channel, check the Voice/Fax Channel Characteristics menu in the Command Facility (access to menu is described in the Voice manual).

1. If the menu displays the wrong interface, the voice port interface is strapped incorrectly. Power off the unit and restrap the voice port interface.
2. If the menu displays the correct interface, the voice port interface strapping may still be misaligned. Power off the unit and check the strapping; restrap, if necessary.
3. If the condition persists after power is on, contact your MICOM Certified Distributor.

Data Channel Expansion Module Indicators

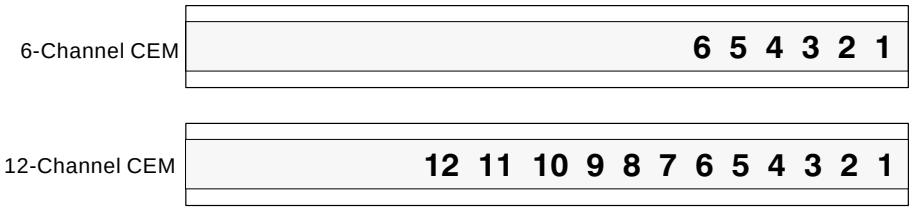


Table D-5. Data Channel Expansion Module Indicators

Indicator	Off	Flashing	On
*n*1 through *n*12[1]	No data activity	Data activity	Data activity

n = module location B through D (Data Channel Expansion Module may not be placed in module location E)

[1] If 5000E/6DMA is installed in module location B and any of the ports are configured as links, refer to Table D-1, port A1 for indicator information.

Note: If the indicator is on a force-connected sync port using either Transparent or TDM protocol, it will remain *on* continuously.

Device Applications E

Extended Wang Support Feature (WANGX)

The extended Wang support feature (WANGX) provides special buffer control, flow control, and code levels for Wang 2200 computer systems support. These systems include 2200 VP, 2200 MVP, and 2200 LVP, all using the 2236 MXD terminal processor and the 2236 DE interactive terminal as a standalone device or with any Wang printer slaved to it.

Communications are serial asynchronous, 11-bit code (1 start bit, 8 data bits, 1 odd parity bit, and 1 stop bit). The data rates normally used for WANGX channels are 300, 600, 1200, 2400, 4800, and 9600 bps.

To activate WANGX for a port, select WANGX buffer control and flow control using the Channel Characteristics menu. A port using WANGX buffer and flow control will be transparent to the standard XON/XOFF characters (DC1 and DC3).

The following points should be noted about ports using WANGX buffer and flow control:

- The View Channel Configuration (page 6-12) display will indicate WANGX buffer and flow control for each port as applicable.
- Ports using WANGX buffer and flow control cannot use the Tandem Computer or Smooth Scroll features.
- Autobaud Rate Detection (ABR) (selected from the Data Rate menu and discussed on page 4-18) does not operate on WANGX ports.
- WANGX ports should be configured in 9-level code, odd parity.

Tandem

Tandem non-stop computer data flow operation requires the use of a signal called T-Pause. T-Pause is a control signal on pin 12 of the Tandem interface. This flow control signal is used as a function in response to remote printing terminal signals *ready, abort,* or *temporary buffer full*. The unit will pass the T-Pause signal when *yes* is selected for Tandem in the Channel Features menu.

Also, when Tandem computer support is enabled, DTR (pin 20) from the terminal is inverted and output as DSR (pin 6) to the host. However, the unit provides normal DTR flow control response to the terminal.

A cable for Tandem computer support is not available from MICOM. The pin assignments for the required cable are shown in the Installation Manual.

To enable Tandem computer support for a port, set the following configuration using the Channel Characteristics menu and the Channel Features menu:

- EIA Control *Enable(d)* at Host and Terminal ends
- Flow Control *DTR* at Terminal end
- Buffer Control *CTS* at Host end
- Tandem *Yes* at Host end

HP ENQ/ACK

The unit can support Hewlett-Packard HP-3000 View systems using type 26XX display stations operating under term type 10. To achieve this, the unit emulates the HP ENQ/ACK pacing mechanism. Remote spooling for HP2631 and HP2635 printers (term type 19) is also supported.

The HP ENQ/ACK protocol is available to any port from the Channel Features menu. When a Host end port (with HP ENQ/ACK option = yes) receives an ENQ poll following a block of data, it immediately emulates the remote terminal by responding with its own ACK. It then passes ENQ along to the terminal.

After outputting the data, the remote unit buffers any additional data until the terminal sends an ACK or a 10-second timer expires. When the ACK is received, the remote unit forwards data to the terminal (but does not forward ACK to the host).

To enable HP ENQ/ACK, set the following configuration using the Channel Characteristics menu and the Channel Features menu:

- HP port should be enabled when term type 10 is configured by the CPU or the terminal user.
- Do not define the DC2 character for either XON or XOFF when using XON/XOFF flow control for Hewlett Packard systems.
- For ENQ/ACK protocol to function properly, one port must be set as *host* and the other port as *terminal*.
- An HP port configured as Host cannot enter the Command Mode.

Spool Mode (Term Type 19)

The spool mode uses XON/XOFF characters from the printer to indicate status conditions to the HP-3000 system. Disable the HP Channel Feature for ports using the spool mode to avoid system timeout. Set Buffer and flow control to *none* (using the Channel Characteristics menu) when HP2631 and HP2635 printers in an HP system are to operate in the spool mode.

Ports with flow control = *none* will not respond to XON/XOFF from the terminal or the computer.

Table E-1 below, summarizes HP and non-HP channel configurations.

Table E-1. Spool Mode

User Terminal Configuration		Marathon Configuration		
Type of Terminal	**Term Type**	**HP Channel**	**Flow Control**	**Buffer Control**
HP26XX CRTs	10	Enabled	XON/XOFF	XON/XOFF
Non-HP 4 (TTY)	Disabled	XON/XOFF	XON/XOFF	n/a
HP2631 and HP2635 Printers	19	Disabled	None	None

Tail-Ending Mode (Dial-Up Modem Operation)

The tail-ending mode operates only for dial-up modems connected to terminal ports. This mode guarantees that a unit, upon recognition of a disconnect request from a dial-up modem, will deliver that disconnect indication to its associated port (the far-end terminal or host), even if the composite line is temporarily out of service.

For dial-in modems, set the configuration as follows:

- EIA Control *Enable*
- Sync Loss Disconnect *Enable*

A high transition of RI on a port with enabled EIA controls, flags the port as a dial-up modem link.

If DSR is dropped by the modem at a dial-up modem terminal interface, the unit will drop all control signals to the modem (DTR, Busy, RTS, and Unassigned). DSR is passed through the link, either immediately or after composite reacquisition. DSR is then held low for one second. The outbound signals in the direction of the modem (DTR, Busy, and RTS) are made transparent.

At the host interface, the tail-ending mode operates with the DTR control signal. When the host drops DTR, the unit will drop RI, DSR, CD, and CTS to the host. DTR is passed to the modem (immediately or after composite sync reacquisition) and is held for one second, after which the previously held controls to the host are allowed to be passed transparently.

Inbound data, which has been buffered in the local unit, will be passed through to the remote terminal or host before interface signal DSR goes low. Outbound data, buffered for the port that performed the disconnect, is discarded.

Notes:
- Performing a reset on a tail-ending port terminates the Command Facility on that port.
- Tail-ending ports may not perform composite loopback tests.
- The remote unit will not display the current configuration for a dial-in port if the values for this port have been changed using the Local Channel Configuration menu.

Glossary

This glossary contains terms used throughout the manual, as well as terms commonly used in the data/voice communications field.

ABR, autobaud rate detection

A process by which a receiving device determines the data rate, code level, and stop bits of incoming data by examining the first character received (usually a preselected sign-on character). ABR allows a receiving device to accept data from a variety of transmitting devices operating at different speeds, which means that the receiver does not need to be configured for each specific data rate in advance.

access channel

The industry-standard term for the frame relay link.

access rate (AR)

The data rate of the frame relay link. The speed of the frame relay link determines how rapidly (maximum rate) the end user can inject data into the frame relay network.

ACK, acknowledgment

A control character used as a reply in communications protocols. For example, in Hewlett-Packard's ENQ/ACK protocol, ACK is sent by the receiving device as a reply to ENQ sent by the transmitting device.

adapter

A device for connecting two items of physically dissimilar types (e.g., an adapter may change an RJ45 connector to a DB-25 connector). Contrast with converter.

aggregate input rate

The sum of all data rates of terminals and computer ports connected to a multiplexer. Burst aggregate input rate refers to the instantaneous maximum data input rate accepted by the multiplexer.

analog

Continuously variable as opposed to discretely variable. Physical quantities, such as temperature, are continuously variable and so are described as analog; analog signals vary in accordance with the physical quantities they represent. The public telephone network was designed to transmit voice in analog form. Contrast with digital.

analog loopback

A diagnostic test that forms the loop at the data communications equipment's telephone line interface, returning transmitted signals to their source.

Annex D

A common management protocol used for frame relay.

AppleTalk

Allows LAN networking among Macintosh computers. All Macintoshes have a LocalTalk port, running AppleTalk over a 230 kbit serial line. AppleTalk also runs over Ethernet (EtherTalk) and Token Ring (TokenTalk) network media.

ARQ, automatic request for retransmission

An error control method in which the receiving device informs the transmitting device which transmission blocks were received successfully. The transmitting device retransmits any blocks not successfully received.

ASCII, American Standard Code for Information Interchange

A 7-bit-plus-parity character set or code established by the American National Standards Institute (ANSI) to achieve compatibility between data services.

async

Short for asynchronous that describes the method of transmission for data. *See* asynchronous transmission.

asynchronous transmission

A method of sending data in which the interval between characters may be of unequal length. The characters transmitted include a start bit and one or more stop bits, which define the beginning and ending of the character. No timing signals need to be sent.

ATM, asynchronous transfer mode

Method of data transmission using cell relay, supporting speeds up to 2.2 gigabits/second, and capable of carrying voice and LAN traffic.

attenuation

Deterioration of a signal's strength as it passes through a transmission medium; generally attenuation increases with both frequency and cable length. The signal level decreases. Attenuation is measured in terms of decibels. Contrast with gain.

autocall

Technique used by voice ports to establish a switched virtual circuit to a pre-defined destination without the telephone equipment sending dialing digits. Similar to the async channel *fixed destination*.

backbone

The primary path of the network or LAN over which the majority of traffic is routed.

backup link

See secondary interconnect link.

backward explicit congestion notification (BECN)

A bit set by a frame relay network to notify the data terminal equipment (DTE) interface device that congestion avoidance procedures should be initiated by the sending device.

baud

A unit of signalling speed. The speed in baud is the number of discrete conditions or signal events per second. If each signal event represents one bit, the baud rate is the same as bps. If each signal event represents more than one bit, as in quadrature amplitude modulation, the baud rate is smaller than bps.

BCC, block check character

A character added to the end of a transmission block for the purpose of error detection.

Bc, committed burst size

The maximum amount of data in bits that a network agrees to transfer under normal conditions over a measurement interval (T). Data may or may not be contiguous. Bc is negotiated with the carrier provider.

Be, excess burst size

The maximum amount of uncommitted data in bits that the network will attempt to deliver over a measurement interval (T). This data may or may not be contiguous. Be is negotiated with the carrier provider.

bit

Contraction of binary digit. This is the smallest unit of information and the basic unit in digital data communications. A bit can have a value of zero or one (mark or space in data communications terminology).

block

The part of an Integration unit's stacking connector that is mounted on the top side of a module.

bps, bits per second

A standard for measuring the rate of data; the number of bits passing a specific point each second.

break or <break>

A spacing condition that exists longer than one character time. Break is often used by a receiving terminal to interrupt the sending device's transmission, to request a disconnection, or to terminate a computer process.

bridge

Equipment connecting two similar local area networks (LANs). The bridge filters out packets that stay on the local LAN and forwards packets intended for the other LANs.

bridge network

Two or more LANs connected together by one or more bridges for other LANs.

bridge/router

A combination of a bridge and a router in a single device. *See also* bridge *and* router.

broadcast

The transmission of a message intended for general reception throughout a network rather than for a specific station on that network.

buffer

Temporary storage area to absorb the difference in transfer rates, or to collect data for more efficient block transferral.

burstiness

In the context of a frame relay network, data that uses bandwidth only sporadically; that is, information that does not use the total bandwidth of a circuit 100 percent of the time. During pauses, links are idle—no traffic flows across them in either direction. Interactive and LAN-to-LAN data is bursty in nature, because it is sent intermittently. In between data transmissions, the link experiences idle time waiting for the data terminal equipment (DTE) to respond to the transmitted data (user's input) or waiting for the user to send more data.

busyout

A configuration option in the voice module that is used to place the voice port into the *busy* state, effectively disabling the port.

byte

A collection of bits operated upon as a unit. Most bytes in data communications are 8 bits long and most character sets use one byte per character. The capacity of storage devices (such as RAM) is frequently given in bytes or in Kbytes (K=1024).

carrier

A continuous signal that is modulated with a second, information-carrying signal.

carrier frequency

The frequency of the signal (carrier), which is being modulated, to transmit data.

CCITT, Consultative Committee for International Telegraph and Telephone

See International Telecommunication Union – Telecommunication Standards Section.

CCM

See Communications Control Module.

CD, carrier detect

A control signal that indicates that the local modem is receiving a signal from the remote modem.

CEM

See channel expansion module.

channel expansion module, CEM

A data channel expansion module for an Integration unit that increases channel capacity depending on the specific module chosen. Available in several versions.

central office, CO

The building where common carriers terminate customer circuits and where the switching equipment that interconnects those circuits is located.

channel

A path for electrical transmission between two or more points. Also called circuit, line, data link, or path. It may be asynchronous, synchronous, or voice.

channel loopback

A diagnostic test that forms the loop at the multiplexer's channel interface.

character

A letter, number, punctuation, or other symbol contained in a message. *See also* control character.

CIR, committed information rate

Used to set a predictable level of service to all users on the network, the CIR is a traffic management mechanism. The user estimates the normal traffic during a busy period, and the network commits the bandwidth to be allocated.

circuit

1) In data communications, a means of two-way communication between two points, consisting of transmit and receive channels. 2) In electronic design, one or more components that act together to perform one or more functions.

class

A name given to a group of one or more async channels. Classes are used to group similar ports for network users and may be viewed as a hunt group where an async user can connect to any available ports in the group.

clock

The timing signal used in synchronous transmission. Also, the source of such timing signals.

cluster

A group of local area networks which have been assigned the same name and are attached via Integration units. A means of organizing the LANs to reduce traffic over a wide area network link. The maximum number of LANs in a cluster is 12.

CNG (calling) tone

A 1.1 KHz interrupted tone, used by automatic fax machines to indicate that a fax message is about to be sent.

code

1) A set of rules that specifies the way data is represented, such as ASCII or EBCDIC. 2) A term used to describe the Integration system software.

code download

A feature allowing the user to download new software to a unit's Communications Control Module (CCM), Integration Router Module, or any analog or digital voice module except 5000VM and 5000IVM. Software may be downloaded locally or remotely via PC or NETMan.

code level

The number of bits used to represent characters.

cold start

A system reset that returns the unit to the factory defaults. Also called a cold reset.

Command Mode

The Integration unit's menu-driven structure that supports local channel configuration, diagnostics, and access to the Command Facility.

Command Facility

The Integration unit's menu-driven structure containing all the configuration, diagnostic and administration options.

command port

A dedicated terminal used to control and monitor a multiplexer system. Also, the interface to which this terminal is connected.

committed burst size

See Bc.

committed information rate

See CIR.

committed rate measurement interval

See Tc

Communications Control Module

The main or base module of the Integration unit which contains the FEATUREPAK or FlashPak cartridge or on-board Flash memory that determines the functionality of the product. The major processing effort occurs within this module.

communications protocol

Means used to control the orderly exchange of information between stations on a data link or on a data communications network or system. Also called line discipline or protocol.

composite

The line-side signal of a multiplexer that includes all the multiplexed data, including asynchronous and synchronous data as well as digitized voice. Also known as a link. *See also* link.

composite link

The line that carries the composite data between units. Also known as a link.

composite loopback

A diagnostic test that forms the loop at the line side (output) of a multiplexer.

compression

The use of statistical methods to reduce the number of bits transmitted across a link, thus reducing bandwidth requirements.

conditioning

The *tuning* or addition of equipment to improve the transmission characteristics or quality of a leased voice-grade line so that it meets specifications for data transmission. The customer pays a monthly charge for conditioning.

configuration switch group

See switch group.

connection

An established data communications path, the process of establishing that path, or a point of attachment for that path.

connector

An electrical device for making one or more connections.

control character

A non-printing character used to start, stop, or modify a function.

control signal

A discrete interface signal used to indicate, start, stop, or modify a function.

converter

A device for connecting two items of electrically dissimilar types (example: RS-232 to V.35). Contrast with adapter.

CPU, central processing unit

The heart (main processor) of a computer system, or the computer system itself.

<cr>, carriage return

1) A code that exists within files and data streams as a line terminator. 2) A user-entered ASCII or EBCDIC control character used to position the print mechanism of a printer or the cursor on a terminal display to the left margin.

CRC, cyclic redundancy check

1) An error detection scheme in which the block check character is the remainder after dividing all the serialized bits in a transmission block by a predetermined binary number. Also, a polynomial based on the data transmitted. 2) A communications device that performs encapsulation. Frame-relay-capable routers and bridges are examples of devices used to interface the customer's equipment to a frame relay network. *See also* encapsulation.

CSA, Canadian Standard Association

A Canadian agency that generates standards, conducts tests, and certifies products to ensure their safety.

CSU, channel service unit

A digital data communications equipment (DCE) unit for data phone digital servers (DDS) lines; interfaces with data service unit (DSU) on customer's premises.

CTS, clear-to-send

An RS-232 interface control signal which indicates to a data terminal equipment (DTE) that it may begin transmitting. Usually issued in response to request-to-send signal.

cyclic redundancy check

See CRC

data

Numbers, text, facts, instructions, and the like, which are represented in a formalized manner that can be manipulated and transmitted by machines.

data compression

A primary technology built into the Integration products. A block of data is compressed for transmission and decompressed upon reception. Fewer bytes are required for the transfer, thus increasing the data transfer rate.

data link connection

See DLC

data link connection identifier

See DLCI

data rate or data signalling rate

A measure of how quickly data is transmitted. It is best expressed in bps. It is, however, often incorrectly expressed in baud. Data rate is synonymous with speed.

dB, decibel

A comparative (logarithmic) measure of signal power, a ratio.

dBm

An absolute measure of signal power, where 0 dBm is equal to one milliwatt into 600 ohms.

dc signalling

A configurable option in an E&M-strapped voice/fax channel.

DCE, data communications equipment

The equipment that provides the functions required to establish, maintain, and terminate a connection (including signal conversion) for communications between a data terminal equipment (DTE) and a telephone line or data circuit. Also, interface signals typically presented by this equipment.

DDS, dataphone digital services

A communications service offered by the telephone company to transmit data in digital form.

DE, discard eligibility

A user-set bit indicating that a frame may be discarded in preference to other frames if congestion occurs, to maintain the committed quality of service within the network. Frames with DE bit set are considered Be data.

delta topology

The simplest form of ring and mesh topology, involving three nodes that are fully interconnected with one another. If one link fails or if there is link congestion, there is an alternate path for all nodes. *See also* mesh topology.

dial-up line, dial line

A circuit or connection on the public telephone network.

DID, direct inward dialing

A service offered by the telephone company allowing an outside caller to dial an internal extension without passing through the operator. Billing does not start until the extension answers.

digital loopback

A diagnostic test that forms the loop at the communication device's data terminal equipment (DTE) interface.

DISA, direct inward system access

A service offered by a PBX that allows incoming calls to the PBX to have dialing access within the private network. It may often be protected by a dialed password. Billing starts when the PBX provides the dial tone.

discard eligibility

See DE

disconnect supervision

A voice feature which indicates to the local user that the remote end has gone off-hook. This feature is significant in loop start application, where disconnect is denoted by removal of power to the station equipment.

DIT, direct in termination

A service offered by a PBX that allows incoming calls to the PBX to be routed directly to a selected telephone or group of telephones without operator intervention. Billing does not start until the telephone answers.

DLC, data link connection

The frame relay data stream.

DLC, data link control

A bit oriented communications protocol that sets up, controls, checks, and terminates information transfer between two stations on a data link.

DLCI, data link connection identifier

1) To identify the different DLCs in a frame relay link, each DLC is assigned a data link connection identifier (DLCI) when a frame relay call is being established. 2) A unique number assigned to a permanent virtual circuit (PVC) endpoint in a frame relay network. Identifies a particular PVC endpoint within a frame relay link in a network; it has local significance only to that link. During the data transfer phase, all the frames belonging to a frame relay call carry the same DLCI in the link layer address field of each frame.

domain

A grouping of LAN nodes in TCP/IP networks that has been assigned a logical name.

downline loading

The process of sending configuration parameters, or operating software, from a controlling device to another device.

DSP, digital signal processor

This microprocessor is used in voice compression and fax demodulation.

DSR, data set ready

An RS-232 interface control signal that indicates that the data communications equipment (DCE) is connected to a telephone circuit. Usually a prerequisite to the data terminal equipment (DTE) issuing RTS.

DSU, data service unit

Data communications equipment (DCE) that replaces a modem in connection to a dataphone digital servicer (DDS): A baseband device, often included in the cost of the DDS circuits.

DSU/CSU

An external device that combines the functionality of a data service unit (DSU) and a channel service unit (CSU). *See also* DSU and CSU. Contrast with ISU.

DTE, data terminal equipment

The equipment serving as the data source and/or destination. May refer to computer ports, terminals, and printers. Also, interface signals typically presented by this equipment.

DTMF, Dual Tone Multifrequency

Used for call addressing in pushbutton telephones. Also known as Multifrequency Pushbutton (MFPB) in Europe.

DTR, data terminal ready

An RS-232 interface control signal that indicates that a data terminal unit (DTE) is ready for data transmission.

E&M

In industry usage, a signalling convention between voice PBXs. As related to MICOM's voice/fax modules, a strapping option for compatibility with the tie-trunk side of a voice PBX. There are five types (Type I through Type V) of E&M strapping options in domestic modules, and three types (Types I, II, and V) in all other modules.

EasyRouter

MICOM's proprietary bridge/router software with IP ARP/IPX SAP/IPX RIP spoofing and data/header compression that resides in an HCF or HCFT LAN FlashPak cartridge. Part of the integral Integration Router Module.

EBCDIC, Extended Binary Coded Decimal Interchange Code

An 8-bit, IBM character code.

echo

The return of transmitted data to its origin.

egress

In a frame relay network, frames moving toward the destination device. Contrast with ingress.

Electronics Industry Association (EIA)

A trade organization that issues its own standards and contributes to American National Standards Institute (ANSI); they developed the RS-232 standard.

encapsulation

A process by which an interface device places an end device's protocol-specific information inside a frame relay frame. The network accepts only frames formatted specifically for frame relay; hence, devices acting as interfaces to a frame relay network must perform *encapsulation*.

enhanced interface module

An interface module (E&M, FXO, FXS) for MICOM's Universal Voice Module which is designed to meet all European and North American regulatory agency requirements.

ENQ, enquiry

A control character used as a request for identification or status in communications protocols. For example, in Hewlett-Packard's ENQ/ACK protocol, ENQ is sent by the transmitting device to determine if the destination terminal is ready for more data. *See also* ACK.

<esc>, escape

An ASCII or EBCDIC character that is used to modify the meaning of the character which follows (dependent on defined protocol). It is often used to set equipment in different modes of operation, to position a cursor on a terminal, or as a signal to computer programs.

explicit congestion notification

A mechanism to indicate the existence of congestion. The notification bits in the frame relay header are either forward (FECN) or backward (BECN). The process could take place simultaneously on multiple DLCIs in response to congestion on a given line or node, thus notifying multiple sources and destinations. *See also* FECN and BECN.

excess burst size

See Be.

fax, facsimile

Transmission of images (written, typed, or drawn material) through a voice/fax channel.

FCS, frame check sequence

The standard 16-bit cyclic redundancy check used for HDLC and frame relay frames. The FCS detects errors occurring in the bits of the frame between the opening flag and the FCS, and is only effective in detecting errors in frames of 4096 octets or smaller. *See also* CRC.

FECN, forward explicit congestion notification

Indicates congestion downstream or toward the destination. *See also* Explicit Congestion Notification.

FEATUREPAK cartridge

The cartridge containing the operating firmware for MICOM products. The FEATUREPAK contains a specific release of software from the factory and cannot be field upgraded. Contrast with FlashPak cartridge.

Federal Communications Commission (FCC)

A Government board that has the power to regulate all U.S. interstate communications systems as well as all international communications systems that originate or terminate in the U.S.

FF, form feed

A control character used to tell a terminal device to go to the top of the next page.

flash bank

A memory bank on the Integration unit's Communications Control Module (CCM) FlashPak, the Universal Voice Module (UVM), on an Integration Router Module, or on the 3K base module (CCM and voice side) into which new software is downloaded and from which software is loaded into the unit's RAM.

Flash memory

Flash memory allows for quick updating of MICOM software. *See* also code download.

FlashPak cartridge

A cartridge containing the operating firmware for MICOM Integration products. The cartridge contains Flash memory, which allows software to be downloaded. Contrast with FEATUREPAK cartridge.

flow control

The procedure for controlling the transfer of data between two points in a data network, such as between a terminal and a multiplexer, to prevent loss of data when the receiving device's buffer reaches its capacity.

force connect(ed)

A dedicated connection between any two ports of the same type. Contrast with switching.

forward explicit congestion notification

See FECN.

fox message

A test message (THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG. 1234567890) that contains all the letters of the alphabet and all the numerals. This is produced in the fox message generator within the unit.

frame check sequence

See FCS.

frame relay

An alternative wide area networking (WAN) connection to leased lines, providing multiple permanent virtual circuits (PVCs) or data link connection (DLCs) within the same physical access line.

frame-relay-capable interface device

A communications device that performs encapsulation. Frame-relay-capable routers and bridges are examples of devices used to interface the customer's equipment to a frame relay network. *See also* encapsulation.

FRAD, frame relay access device

The equipment used to access the frame relay network.

full-duplex

Simultaneous two-way independent transmission.

FXO, Foreign Exchange Office

An off-premise telephone extension. The Universal Voice Module offers an FXO interface. The equivalent term used in the domestic and international voice/fax module is OPX.

FXS, Foreign Exchange Station

In the voice environment, a telephone extension that has been extended off-premises. The Universal Voice Module offers an FXS interface. The equivalent term used in the domestic and international voice/fax module is KTS.

gateway

In LAN technology, a server that can access two or more different networks. As such, it can forward messages across networks that other hosts would not be able to access. The gateway generally has multiple IP addresses (one for each network). For example, a gateway might *live* at addresses 192.6.7.8 and 193.6.7.8. Hosts wishing to forward messages address the messages to the gateway, which passes them on to the other network. Contrast with bridge.

half-duplex

Transmission in one direction at a time.

hardware reset

Resets date and time but retains the current configuration. On Integration units this reset is accessed from the front.

header

Pins on a circuit board onto which a jumper can be installed for hardware configuration purposes.

host

The central computer (or computer systems) that provides primary data processing functions.

hub group

This term is most often used in discussions of switching. Each Integration unit is considered a hub. An Integration unit and all attached MICOM muxes form a hub group.

Hz, hertz

A measure of frequency or bandwidth equal to one cycle per second. Named after experimenter Heinrich Hertz.

indicator lights

The light emitting diodes on the front of the Integration unit.

ingress

In a frame relay network, frames moving from an access device toward the frame relay network. Contrast with egress.

input level

A level of relative analog signal strength obtained from the attached telephone equipment, as measured in the voice/fax module.

input level display

A voice channel visual indication of the input level as displayed by the voice/fax module. Used as a diagnostic tool to monitor the input signal level.

integrated service unit (ISU)

An interface device that combines the functions of a Digital Service Unit (DSU) and a Channel Service Unit (CSU); a module for an Integration unit. Contrast with DSU/CSU.

Integration Hub

A product in the STADIA family that offers a 12-slot chassis, which can house up to four Marathon or NetRunner CCMs and associated modules.

Integration Router Module

An integral module available on Integration units that offers router functionality. This LAN product is used to connect remote LANs across a WAN.

Integration unit

MICOM product which utilizes *MicroBand* ATM technology to multiplex data, voice, facsimile, and LAN traffic over low cost leased lines. The NetRunner, Marathon, and STADIA Integration Hub are members of this group.

interconnect link

A composite link that connects any two of the following units: Marathon, NetRunner or STADIA Integration Hub.

International Telecommunications Union – Telecommunications Standards Section, ITU-TSS

Formally the CCITT, this committee makes international communications recommendations to participating members. These are frequently adopted and made standards by national organizations. The ITU-TSS develops recommendations that pertain to interfacing, modems, and data networks. Membership includes various scientific and trade associations, as well as governmental and private companies.

Internet

A collection of TCP/IP world-wide networks and gateways, including ARPAnet, MILnet, and NSFnet.

IP Address

See Network Address.

IPX, Internet Packet Exchange

Novell NetWare's native local area network communications protocol.

jumper

A miniature connector that fits over, and electrically connects two pins.

Kbps, kilobits per second

One thousand bits per second. (Example: 19,200 bps is 19.2 Kbps.)

KTS, key telephone system

In industry usage, a key telephone system in which the telephones have multiple pushbuttons to allow users to select outgoing/incoming calls directly, without dialing an access number such as 9. Generally, a key telephone system has limited internal telephone-to-telephone capacity. As related to MICOM's domestic and international voice/fax modules, a strapping option for compatibility with KTS-type telephone interface equipment. In Universal Voice Module, the option is called FXS.

LAN, local area network

A data communications network confined to a limited geographic area (up to 6 miles or about 10 kilometers) with moderate to high data rates (230 Kbps to 100 Mbps). The area served may consist of a single building, a cluster of buildings, or a campus-type arrangement. It is owned by its user and includes some type of switching technology, and does not use common carrier circuits although it may have gateways or bridges.

LAPB, link access procedure balanced

The balanced-mode, enhanced version of HDLC. Used in X.25 packet-switching networks. Contrast with LAPD.

LAPD, link access procedure on the D-channel

A protocol that operates at the data link layer (layer 2) of the OSI architecture. LAPD is used to convey information between layer 3 entities across the frame relay network. The D-channel carries signaling information for circuit switching. Contrast with LAPB.

LAPF, link access procedure F (Frame Relay)

This is a common name applied to a modified LAPD specification which is defined in the CCITT Q.922 standard for frame relay. Basically it is similar to LAPD, but modified for frame relay.

LAT, Local Area Transport

A Digital Equipment Corporation proprietary local area network network communication protocol. The protocol is based on the idea of a relatively small, known number of hosts on a local network sending small network packets at regular intervals.

LCD, liquid crystal display

See liquid crystal display.

leased line

A telephone line reserved for the exclusive use of the leasing customer without interexchange arrangements.

legacy data

Non-local area network data, async and sync data traffic.

LF, line feed

A form of line termination in files and data streams. Also a control character used to tell a terminal device to go to the next line.

link

A communications circuit or transmission path connecting multiple points in a network, a composite. There are several types of link in the Integration product: An *Interconnect Link* connects any two Integration units over a leased line using an analog or digital circuit provided by the telephone company. A *Secondary Interconnect Link* connects to Integration units via a TA (Terminal Adapter), modem, or Switched 56 DSU/CSU. This link serves as a backup to an interconnect link. A *Local Interconnect Link* connects two Integration units (limited to specific models) located within 25 feet of each other (co-located). *A Frame Relay Link* connects two Integration units over the public frame relay network and provides multiple permanent virtual circuits (PVCs) within the access link. A *Mux Link* connects an Integration unit to a MICOM mux directly over a leased line using a line driver or modem. An *X.21 bis Link* connects an Integration unit to a MICOM mux over a *pay as you go* dial up line.

link access procedure balanced

See LAPB.

link access procedure on the D-channel

See LAPD.

liquid crystal display, LCD

The 80-character display in the front of 5-slot Integration units that consists of two 40-character lines. It is used for real time status and alarm messages, time-of-day, and by use of the adjacent keypad, it provides access to configuration, diagnostics, and administration functions.

local analog loopback

An analog loopback that forms the loop at the line side (analog output) of the local modem.

local channel loopback

A channel loopback that forms the loop at the input (channel side) of the local multiplexer.

local composite loopback

A composite loopback that forms the loop at the output (composite side) of the local unit.

local digital loopback

A digital loopback that forms the loop at the input (digital side) of the local modem.

local interconnect link

An interconnect link designed for connection between any two Integration units that are located in close proximity. This link is limited to specific models.

loopback or loopback test

A type of diagnostic test in which the transmitted signal is returned to the sending device after passing through all, or a portion of, the data communications link or network. This allows the technician (or built-in diagnostic circuit) to compare the returned signal with the transmitted signal. This comparison provides the basis for evaluating the operational status of the equipment and the transmission paths through which the signal traveled.

Marathon

Family of products that provide cost-effective integration of data, voice, fax and LAN communications to T1/1 speeds on public frame relay, ISDN and leased line services.

mark

In data communications, a binary 1 state, which is the steady, no-traffic state for asynchronous transmission.

mesh topology

A communications circuit or transmission path within a network that has *closed loops*. Since there is more than one path between nodes, mesh topology offers redundancy in the event of link failure or congestion. *Full mesh* topology occurs when all nodes are directly connected to all other nodes. *See also* delta topology *and* ring topology.

MIB, Management Information Base

A tree-structured database of management information stored within the internal memory of a local area network (LAN) device that is configured with an Simple Network Management Protocol (SNMP) agent. This database is used to monitor device operation and change device configurations.

MICOM mux

Those MICOM multiplexers that are compatible to an Integration unit. All ports on a MICOM mux are addressable by the network so that connections can be made on an individual basis. MICOM muxes are connected to an Integration unit via a mux or X.21 link.

***MicroBand* ATM**

MICOM's networking protocol that forms the network backbone for integrated voice/fax/local area network data networks over sub-T1/E1 communications lines. This protocol is a combination of Fast Packet and Cell Relay technologies; each packet is exactly the same length (in contrast with V.21 and frame relay networks).

modem

Contraction of MOdulator-DEModulator. A device that converts serial digital data from a data terminal equipment to a signal suitable for transmission over a telephone line, and converts the received signal to serial digital data for the DTE. Also called a data set.

module

A printed circuit board and components with specific functionality that plug into one of the module locations on the unit.

module location

A physical and logical location of modules within a 3- or 5-slot chassis. These are described from bottom to top as module location A-E (or A-C in a 3-slot chassis). In the Integration Hub, this is the logical location of a module (B-E) in respect to its associated Communications Control Module (CCM) which is in location A.

ms, millisecond

One-thousandth of a second.

multicast

A message that is sent out to a group of local area network nodes by a host. Multicasts are generally sent at specified intervals to avoid cluttering the LAN, and contain the name of the host sending them as well as information about what services that host provides.

multiplexer

A device that combines the signals of many devices and types into a composite signal for transmission to a remote destination.

mux

Short for multiplexer. *See also* MICOM mux and multiplexer.

mux link

A composite leased line link that connects a MICOM mux to an Integration unit.

NAK, negative acknowledgment

A control character that indicates that the previous transmission block was received in error.

NETMan

The optional UNIX-based network management system for Integration networks.

NetWare

A Novell-developed local area network operating system that provides file and printer sharing among networks of personal computers.

network address

Every node on a local area network has one or more addresses associated with it.

Every node has what is called a *hardware address* that is unique across every network everywhere, at any time. If you know a node's hardware address, you should be able to identify the exact piece of equipment to which it belongs. Hardware addresses are generally set up by the company that manufactured the equipment and should never change. This address is usually specified as a list of six hexadecimal numbers separated by dashes, such as ae-34-2c-1d-69-f1. The hardware address for the LAN module is shown on a label on the back panel of the module. In the case of TCP/IP networks, each node also has a *software* or *IP* address.

Every node also has a *software address* for each network protocol that node uses. The software address is configured by the network administrator. The software address format varies according to the network protocol:

- For TCP/IP, the software address is specified as four decimal numbers separated by periods (for example, 197.49.155.247). In this case, each number must be between 0 and 255, and each segment of the number corresponds to a different network or sub-network.
- For IPX, the software address is a combination of the LAN segment or WAN network number plus the node's own network number. IPX network numbers are in the range 1 to FFFFFFFE hexadecimal.
- For AppleTalk, the software address is assigned dynamically from a range of addresses configured into the network's seed router.
- For DECnet, the software address is a combination of the network area number plus the node's own network number, expressed in the form "`area.node`".

node

1) Any unit or MICOM mux in an Integration network. Each node has a unique name (id) and number. 2) In local area network (LAN) technology, any intelligent device physically connected to the network. A LAN node can be thought of as any device that has a hardware address.

nonvolatile

A term used to describe a data storage device (memory) that retains its contents when power is lost.

null character

A character (usually all bits set to mark) used to allow time for a printer's mechanical actions to take place so that the printer will be ready to print the next data character. Sometimes called idle character.

NULL password

A password *configured* for no password. A password can be deleted by configuring a NULL password.

off-hook

A line condition caused when a telephone handset is removed from its cradle, if the line is active.

on-hook

A line condition that exists when a telephone handset is resting in its cradle, if the line is active.

OPX, off-premises extension

In industry usage, an off-premise telephone extension. As related to MICOM's domestic and international voice/fax modules, a strapping option for compatibility with the station side of a voice PBX. In the Universal Voice Module, the interface is called FXO.

pad character

A character inserted to fill a blank time slot in a synchronous transmission or to fulfill a character count requirement in a transmission of fixed block length. In Integration units, leading pad characters help establish synchronization, and trailing pad characters prevent the dropping of the RLSD/RTS signal too soon after the end of a frame.

parameter

An element, the value of which characterizes the behavior of one or more variables associated with a given system.

parity, parity bit

A bit added to a character to ensure that the total number of 1s in a grouping of bits is either always even for even parity, or odd for odd parity. This permits detection of signal errors.

Part 15, FCC

A part of the FCC body of rules that defines the restrictions to the level of electromagnetic emissions for an electronic device.

Part 68, FCC

A part of the FCC body of rules that defines the technical requirements that an electronic device must meet before it can be connected to the telephone network.

PBX, private branch exchange

A privately owned phone system installed within the premises of an organization. It allows communication among users within the organization, as well as between those users and the outside world. It differs from a key telephone system in that the user must dial an access number, such as 9, to get an outside line.

PDN, public data network

A network established and operated by a Post Telephone, and Telegraph Authority (PTT), common carrier, or private operating company for the specific purpose of providing data communication services to the public.

permanent virtual circuit

See PVC.

point-to-point

A communications circuit or transmission path connecting two points. In the Integration unit that connection can be force connected (dedicated point-to-point) or switched (switched point-to-point).

port

A physical connector on the back of the Integration unit. Also, an interface capable of attaching to a device for communications with another device.

Power Plus

Redundant power supply kit available for any 5-slot Integration unit. Power Plus provides two separate power supplies which share the load equally; should one power supply fail, the other assumes the full load.

primary interconnect link

An interconnect link associated with a secondary link.

protocol

Any standard method of communicating over a network (LAN or WAN).

PTT, Post, Telephone, and Telegraph Authority

A government agency that functions as the communications common carrier and administrator in many areas of the world.

PVC, permanent virtual circuit

1) A logical link, whose endpoints and class of service are defined by network management. 2) (In frame relay) Analogous to an X.25 permanent virtual circuit, a PVC consists of the originating frame relay network element address, originating data link control identifier, terminating frame relay network element address, and termination data link control identifier (DLCI). Originating refers to the access interface from which the PVC is initiated. Terminating refers to the access interface at which the PVC stops. Many data network customers require a PVC between two points.

QAM, quadrature amplitude modulation

A modulation technique that combines phase and amplitude modulation to increase the number of bits per baud.

RA, access rate

The data rate, in bps of the frame relay link. The rates available are in increments of 64 and 56 Kbps segments (64, 128, 192, etc. or 56, 112, 168, etc.).

RAM, random access memory

A storage device into which data can be entered (written) and read; usually (but not always) a volatile semiconductor memory.

RBOC, Regional Bell Operating Companies

The seven Regional Bell Operating Companies that are committed to developing and offering a standardized nationwide frame relay service to prevent the formation of public *frame relay islands*. Although this effort is not completed, it is well on its way to being realized by the standardization of the Network to Network Interface (NNI).

RD, receive data

An RS-232 data signal received by the data terminal equipment (DTE) from a data communications equipment (DCE).

remote analog loopback

An analog loopback that forms the loop at the line (analog output) side of the remote modem.

remote channel loopback

A channel loopback that forms the loop at the input (channel side) of the remote unit.

remote composite loopback

A link loopback that forms the loop at the output (composite side) of the remote unit.

remote digital loopback

A digital loopback that forms the loop at the input side of the remote modem.

remote terminal server (RTS)

An optional module for the Marathon unit that provides remote access to an Ethernet local area network (LAN) over a wide area network (WAN), as well as from LAN to remote devices over the LAN.

request to send (RTS)

An RS-232 interface signal, sent from a data terminal equipment (DTE) to the data communications equipment (DCE), that indicates the DTE has data to transmit.

RI, ring indicator

An RS-232 interface signal, sent from the modem to the data terminal equipment (DTE), that indicates that an incoming call is present.

ring topology

A form of mesh topology where three or more nodes are connected to one another in the form of a ring (similar to a daisy chain with the loop closed). In the event of link failure, there is an alternate path between nodes. *See also* mesh topology.

RJ-type connector

A modular connector that complies with certain telco standards.

ROM, read-only memory

A nonvolatile semiconductor storage device manufactured with predefined contents.

router

A device that looks at a local area network (LAN) packet's destination address to determine which LAN network is its destination. The router will then find the best path to use to send the packet across the network(s).

RS-232

An Electronics Industry Association recommended standard that is the most common for connecting serial data processing devices. RS-232 specifies the electrical characteristics of the signals in cables that connect a data terminal equipment (DTE) to a data communications equipment (DCE). An RS-232 standard is functionally identical to ITT-TSU V.24/V.28.

RS-422

An Electronics Industry Association recommended standard for cable lengths that extended the RS-232 50 foot limit. Although introduced as a companion standard with RS-449, RS-422 is most frequently implemented on unused pins of DB-25 (RS-232) connectors. Electrically compatible with ITT-TSU recommendation V.11.

RS-423

An Electronics Industry Association recommended standard for cable lengths that extended the RS-232 50-foot limit. Although introduced as a companion standard with RS-422, RS-423 is not widely used. Electrically compatible with ITT-TSU recommendation V.10.

RS-449

An Electronics Industry Association recommended standard for the mechanical characteristics of connectors; introduced as a companion standard to RS-422 and RS-423. This specifies two connectors (a 37-pin connector and a 9-pin connector); not widely used.

RS-530

An Electronics Industry Association recommended standard for the implementation of standard RS-422 or RS-423 Driver/Receivers on a 25-pin connector (DB-25). This is intended as a replacement for RS-449 for most data services using the same connector as RS-232.

Rx, receive

An abbreviation meaning receive or reception.

secondary interconnect link

Also known as a backup link, the link serves as a back up to an interconnect link in the event of primary interconnect link failure.

server

A local area network node that provides services to other nodes on the LAN. Servers provide printer access and spooling, file access, gateways, etc.

SF, single frequency

See tone signalling.

shroud

The part of an Integration unit's stacking connector that is mounted on the underside of a module.

signaling

A handshaking protocol used between telephone equipment. Includes supervising (on/off hook line status), alerting (ringing), and call addressing (dialing) for switched services.

sign-on character

The first character sent on an auto-baud-rate circuit. It is used to determine the data rate.

single dial tone plan

A Universal Voice Module feature that supports PBX-to-PBX dialing over the network. It allows dialing of network extension digits sequentially with PBX digits without waiting for a dial tone from the distant PBX.

SNAPS

MICOM's System Network Architecture Protocol Spoofer for connecting the Integration unit and AS/400 host and IBM 5250 and 3270 controllers.

SNMP, Simple Network Management Protocol

A standard protocol used to monitor, troubleshoot, and control other SNMP-compliant devices attached to the network. SNMP defines a set of variables that must be kept and it specifies that all operations are a side-effect of fetching or storing data variables. The public domain standard is based on the operational experience of TCP/IP internetworks within DARPA/NSFnet.

software reset

A reset performed by the software. This may be a warm or cold start.

SOH, start of header

A control character used to indicate the beginning of a message header.

space

Represents a binary 0 in data communications.

spacer

A piece of hardware that separates one module from another in the unit.

stacking connector

A coupling containing electrical pins or sockets that are located on the top and bottom of a module board to connect electrical wires from one module board to another. The connector on the underside is referred to as a shroud, and the connector on top is referred to as a block.

STADIA

A MICOM product family that offers multiple Integration nodes in a single chassis. The Integration Hub is a STADIA product.

standard interface module

An interface (E&M, FXO, FXS) module for MICOM's Universal Voice Module that is designed to meet U.S. regulatory agency requirements.

start bit

The first bit in asynchronous transmission, used to indicate the beginning of a character.

stop bit

The last bit in asynchronous transmission, used to indicate the end of a character.

strapping

A hard-wire method used to configure an Integration unit module.

STX, start of text

A control character used to indicate the beginning of a message.

sub T-1

A term used generically for any data or voice equipment operating at rates below 1.544 Mbps. Generally this covers equipment operating at 9.6 Kbps to 512 Kbps; i.e., voice grade lines, Dataphone Digital Services (DDS) lines and Fractional T1 lines.

switch group

A group of switches encased in a block mounted on a printed circuit board. It is also called dip switch or configuration switch group.

switched traffic

Data which passes through the node. The traffic is neither originated nor answered at the node. Contrast with terminated traffic.

switching

Selective interconnection of ports of a like kind on request on local and/or remote nodes. Async and voice/fax ports can be switched; sync ports cannot. Contrast with force connect(ed).

SYN, synchronous idle

In synchronous transmission, a control character used to maintain synchronization and as a time fill in the absence of data.

sync

Short for synchronous that describes the method of transmitting data. *See* synchronous transmission.

synchronous transmission

Transmission in which the data characters and bits are transmitted at a fixed rate with the transmitter and receiver synchronized. This eliminates the need for the start and stop bits that are used in asynchronous transmission.

tail circuit

A circuit to a network node, normally a leased line.

Tc, committed rate measurement interval

The interval during which the user can send only Bc data and Be data. In general, the duration of Tc is proportional to the *burstiness* of the traffic. Tc is computed as Tc = Bc/CIR. Tc is not a periodic interval; instead it is used only to measure incoming data. Incoming data triggers the Tc interval, which continues until it completes its computed duration. *See also* Bc and CIR.

TCP/IP, Transmission Control Protocol/Internet Protocol

A network protocol set. TCP/IP may be integral to an operating system, as in UNIX, or it can be a separate product.

IP is the low level protocol for the TCP/IP protocol set. Ip provides packet delivery services between nodes; on the same level as IP are ARP and RARP.

TCP is a reliable stream-delivery, virtual circuit connection-oriented protocol that runs on top of IP. TELNET, FTP, and rlogin use TCP connections.

TD, transmit data

A control signal where data is sent from the data terminal equipment (DTE) to data communications equipment (DCE).

TDM, time-division multiplexer

A multiplexer which apportions the time available on its composite link between its channels, usually interleaving bits or bytes of data from successive channels.

telco

An abbreviation for any telephone company.

terminal

Any device capable of sending or receiving data over a data communications channel.

terminated traffic

Data which is either originated or answered on the local node. Devices are attached directly to the node. Contrast with switched traffic.

tie line

A line leased from the telephone company for the purpose of connecting two PBX units. This allows private communication between two sites.

timeout

The expiration of a predefined interval which then triggers some action.

T, measurement interval

The time interval over which rates and burst sizes are measured. In general, the duration of T is proportional to the burstiness of the traffic. This measurement is provisioned in multiples of 100 ms.

tone signaling

A configurable option in E&M-strapped voice/fax channels.

traffic

Generic term for communications activity over a link.

Tx, transmit

An abbreviation for transmit, transmitter, transmission or transmitting.

Types I to V

Strapping options on the voice/fax module used to match the E&M-strapped channel with one of five PBX trunk types.

Universal Voice Module

MICOM's voice/fax module with plug-in modules for the required interface (E&M, FXO, and FXS).

VF, voice frequency

Any frequency within that part of the audio-frequency range essential for speech transmission of commercial quality (300-3000 Hz). This is the frequency range used over telephone lines.

virtual circuit

A logical path between two subscribers on a network that is established only for the duration of the call.

WAN, wide area network

A network that connects one or more remote locations via common-carrier provided lines. Contrast with LAN.

warm start

A system reset that maintains the current configuration. In the Integration unit a warm start may be performed in the Command Facility or at front of the unit.

XON, XOFF

Control characters used for flow control.

X.21 bis link

Commonly used in European countries, this is a *pay as you go* link. When a signal is raised, the modem automatically establishes a link to the remote side. This link is utilized for Integration units-to-MICOM mux connections.

Zero CIR

A service offered on some public frame relay networks providing no committed information rate (CIR); you only pay for the bandwidth when used. Since there is no commitment from the carrier provider, the risk is that you may not be able to communicate at any time.

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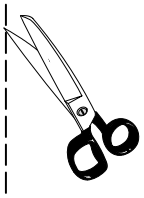

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